

**GERANIUM PROJECT AREA
DRAFT ENVIRONMENTAL ASSESSMENT
OCTOBER 2004**

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Glossary (Terms, Abbreviations, and Acronyms)

At Risk Community (ARC)

Communities located in the vicinity of Federal lands that are at high risk of wildfire

BA

Basal area – The cross-sectional area of a stand of trees measured 4.5 feet from ground level. The area is expressed in square feet per acre.

BMPs

Best management practices – Land management methods, measures or practices intended to minimize or reduce water pollution.

Board Foot

A unit of timber measurement equaling the amount of wood contained in a board one inch thick, 12 inches long, and 12 inches wide.

Canopy Closure

The percentage of the ground and/or sky covered by vegetation and/or branches. These are perceived from a human point of view perpendicular to flat ground.

CCF

One hundred cubic feet (of wood volume).

CFR

Code of Federal Regulations

Classified Road

A road that is needed and intended for long-term vehicle use.

Closed Road

A road that is closed to all vehicular traffic for more than one year.

CMAI

Culmination of mean annual increment – The point at which a tree or stand achieves its greatest average growth, based on expected growth and assumed management systems and utilization standards.

Commercial Thinning

Removing from a stand some of the trees that have reached sufficient size to be manufactured into a product in order to improve tree spacing and increase growth.

Commercial Timber Sale

The selling of timber from National Forest System lands for the manufacture of commercial products such as lumber, plywood, etc.

Cover Type

The vegetative species that dominates a site.

Cull Logs

Logs that do not meet commercial specifications due to defects in the wood.

Decommissioned Road

In this document, a decommissioned road is one that is permanently removed from the transportation system and closed to vehicle use.

DBH

Diameter at breast height – The diameter of a standing tree at a point 4.5 feet from ground level.

EA

Environmental assessment

Forb

Any herbaceous plant other than those in the grass, sedge, and rush families (any non-grasslike plant that has little or no woody material).

FSH

Forest Service Handbook

Fuel Loading

The volume of the available or burnable fuels in a specified area, usually expressed in tons per acre.

Fuel Treatment

Any manipulation or removal of fuels to reduce the likelihood of ignition and/or lessen potential damage and resistance to control.

Habitat Effectiveness

The capability of an area to support elk or deer based on forage, cover, open roads, and the spatial distribution of these factors.

Hard Snag

A dead or partially dead tree composed primarily of sound wood.

Hardwoods

Broadleaf trees or shrubs.

IDT

Interdisciplinary team – A group of individuals with different specialized training.

Landing

Any place where round timber is assembled for further transport.

Late Succession

Ecosystems distinguished by old trees and related structural features.

Logging Slash

The wood residue left on the ground after timber harvest (tops, branches, etc.).

Lopping

Cutting fallen tree branches and stems into smaller pieces.

MA

Management area (see p. 3)

MMBF

Million board feet

MIS

Management Indicator Species – Species selected to monitor the effects of planned management activities on populations of wildlife and fish, including those that are socially or economically important.

Mitigation

See p. 26

Monitoring

The sample collection and analysis of information regarding Forest Plan management practices to determine how well objectives have been met, as well as the effects of those management practices on the land and environment.

NEPA

National Environmental Policy Act of 1969

NFMA

National Forest Management Act of 1976 (amends the Forest and Rangeland Renewable Resources Planning Act)

NFSR

National Forest System Road – A forest road under the jurisdiction of the Forest Service.

Non-commercial Thinning

Removing from a stand some of the trees that are too small to make a merchantable product in order to reduce fuels.

Noxious Weeds

Those plant species designated as weeds by federal state laws; generally non-native, aggressive, and difficult to manage.

PFA

Post-fledging family area (see p. 51)

POL

Products other than logs – Products such as posts, poles, and fiber from trees or parts of trees less than sawlog size.

Prescribed Burning

Controlled application of fire under specified environmental conditions that allow the fire to be confined to a predetermined area while producing the fire intensity and rate of spread required to attain planned resource management objectives.

R2

Region 2 (Rocky Mountain Region of the Forest Service)

Road Density

Miles of road per square mile of land.

Sanitation Treatment

The removal of trees occupied by insect or disease pests to reduce pest populations and limit their spread.

Sawtimber

Trees suitable in size and quality for producing logs that can be processed into lumber; generally those with a diameter of 8 inches or greater.

Seed tree Cutting

A harvest method that leaves a small number of seed-bearing trees singly or in small groups to provide seed for regeneration of the site.

Sensitive Species

Those plant and animal species identified by the Regional Forester for which population viability is a concern.

Shelterwood Seed cutting

A harvest method that leaves a portion of the mature stand in place as a source of seed.

Skidding

Moving logs from the stump to a collecting point.

SS

(Habitat) structural stage (see p. 43)

Unclassified Road

A road that is not constructed, maintained, or intended for long-term vehicle use.

USDA

United States Department of Agriculture

USDI

United States Department of the Interior

VSS

Vegetation structural stage (p. 51)

WUI

Wildland Urban Interface (Fuels in areas where humans and their developments meet or intermix with wildland fuels.)

WCP

Watershed Conservation Practices
(FSH 2509.25)

INTRODUCTION

The Northern Hills Ranger District proposes to harvest timber, thin dense forest stands, reduce hazardous fuel conditions, enhance plant and wildlife habitat, improve roads, and restrict motorized use of other roads in the Geranium Project Area. The Geranium Project Area is located southeast of Spearfish, South Dakota, and is within the Northern Hills Ranger District, Black Hills National Forest. This action is needed in order to provide a sustainable supply of commercial timber, reduce hazardous fuels, maintain or enhance plant and wildlife habitat, improve management of the transportation system, and improve riparian condition.

The environmental analysis documented here is tiered to:

- 1) The 1997 Revised Land and Resource Management Plan (“Revised Forest Plan”) for the Black Hills National Forest.
- 2) The Final Environmental Impact Statement (“FEIS”) associated with the Revised Forest Plan.
- 3) The environmental assessment and decision notice for the 2001 Phase 1 Amendment (“Phase 1 Amendment”) to the Revised Forest Plan.

The analysis also references the file titled Analysis and Evaluation of the Geranium Project Area (“project file”). The project file documents the interdisciplinary team’s evaluation of effects.

The Black Hills National Forest is implementing the Revised Forest Plan as required by the Forest and Rangeland Renewable Resources Planning Act of 1974 (“RPA”, P.L. 93-378) and the National Forest Management Act of 1976 (“NFMA”, P.L. 94-588).

This EA documents the site-specific effects of implementing the proposed actions and alternative actions. The FEIS and Revised Forest Plan are available for review at the Northern Hills Ranger District Office in Spearfish, South Dakota, as well as at the Forest Supervisor’s Office in Custer, South Dakota.

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. This is not a decision document. The responsible official will document the decision in a separate Decision Notice.

This document is organized into five parts:

Purpose of and Need for Action: The section includes information on the history of the project proposal, reasons for the project, how the Forest Service informed the public of the proposal, how the public responded, and the resulting issues utilized to develop alternatives to the proposal.

Alternatives Including the Proposed Action: This section provides a description of the agency’s proposed action as well as alternative methods for achieving the stated

purpose. This discussion also includes mitigation measures. Finally, the section provides summary tables for each alternative.

Environmental Consequences: This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area.

Agencies and Persons Consulted: This section provides a list of preparers and agencies consulted during the development of the environmental assessment.

Appendices: The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of Project Area resources, may be found in the project file located at the Northern Hills Ranger District Office in Spearfish, South Dakota.

1 PURPOSE OF AND NEED FOR ACTION

Chapter Contents	
1.1	Project Area Location
1.2	Management Areas
1.3	Needs and Opportunities
1.3.1	<i>Revised Forest Plan Goals and Objectives vs. Existing Conditions</i>
1.3.2	<i>Purpose of and Need for Action</i>
1.4	Issues
1.4.1	<i>Public Involvement</i>
1.4.2	<i>Identification of Relevant Issues</i>
1.5	Decisions to be Made

1.1 Project Area Location

The Project Area is located in Lawrence County, South Dakota in the northwestern Black Hills. Legal description is shown in Table 1.

Project Area location		
Legal description		
Township	Range	Section
3 North	1 East	3-5, 8, 9, 16
4 North	1 East	1-18, 20-29, 32-34
4 North	2 East	6, 19
5 North	1 East	34-36
5 North	2 East	31
<i>Black Hills Meridian</i>		

Table 1. Project Area Location

The Geranium Project Area encompasses 17,449 acres of National Forest System land and 581 acres of private land, for a total of 18,030 acres. Proposed activities would occur on National Forest System lands. Log hauling may occur across areas of private land on which the Forest Service has acquired right-of-way.

1.2 Management Areas

The Revised Forest Plan assigns a management emphasis to each portion of the Forest to meet multiple-use objectives. For each designated management area (MA), Chapter 3 of the Revised Forest Plan includes a description of desired future condition, goals, objectives, standards, and guidelines. National Forest land in the Geranium Project Area is allocated to the following management areas (Figure 1):

3.32 – Backcountry Non-motorized Recreation Emphasis (417 acres)

These areas are managed to provide recreation opportunities in a semi-primitive setting. Summer use is non-motorized. Over-the-snow vehicles could be allowed in snow

season. Vegetative management practices are available, usually to meet specific recreation or wildlife objectives, which generally maintain a mature forest appearance. The portion of Management Area 3.32 within the Project Area involves Little Spearfish Creek.

4.1 - Limited Motorized Use and Forest Product Emphasis (578 acres)

These areas are managed for non-motorized recreation, while providing for timber production, forage production, visual quality and a diversity of wildlife. Roads provide intermittent commercial access, but are normally closed to other than administrative use. Off-road vehicle travel is prohibited. The portion of Management Area 4.1 within the Project Area involves the Eagle Cliff Cross Country Ski Area.

4.2A - Spearfish Canyon (316 acres)

This area is managed for recreational opportunities in roaded settings that appear natural. Fire and fuels are managed through control practices and prescribed fire to protect biological and scenic values. Off-road vehicle travel is prohibited.

5.1 - Resource Production Emphasis (14,190 acres)

These areas are managed for wood products, water yield and forage production, while providing other commercial products, visual quality, diversity of wildlife and a variety of other goods and services.

5.6 - Forest Products, Recreation and Big Game Emphasis (1,948 acres)

This area is managed for timber production, motorized and non-motorized recreational opportunities, and big game habitat value, with low open road densities and near-optimum arrangement of forage and cover areas.

The project interdisciplinary team (IDT) reviewed the management area designations and found them appropriate.

Figure 1. Management areas

1.3 Needs and Opportunities

The actions proposed in the Geranium Project Area are based on objectives found in the Revised Forest Plan and needs derived from a comparison of desired conditions and existing conditions. This section reviews these site-specific comparisons and defines the purpose of and need for action in the Project Area.

1.3.1 Revised Forest Plan Goals and Objectives vs. Existing Conditions

The Revised Forest Plan includes multiple-use goals and objectives for management of the Forest. These goals and objectives are described in Chapter 1 of the Revised Forest Plan. They include protecting basic resources, providing for a variety of life through diverse ecosystems, providing for sustained commodity uses, and providing scenic quality, recreational opportunities, and heritage resource protection.

This section compares relevant Revised Forest Plan direction to the conditions that currently exist in the Project Area. The comparisons show where needs and/or opportunities for action exist.

Goal 1. Protect basic soil, air, water and cave resources.

Objective 103: Maintain or improve long-term stream health. Achieve and maintain the integrity of aquatic ecosystems to provide stream-channel stability and aquatic habitats for water quality in accordance with state standards.

Objective 104: Maintain or enhance watershed conditions to foster favorable soil relationships and water quality.

Objective 105: Prohibit motorized vehicle use in wetlands, wet meadows, and riparian areas, except at specified locations and times of the year.

There are several areas along NFSR 134.3D where the existing road crosses boggy areas and influences the stream channel and water quality by providing direct sediment sources. An opportunity exists to restore this area either through physical measures or road closure.

Sedimentation is occurring or could occur after rainstorms in other locations due to placement of existing roads, damaged or inadequate drainage structures, and motorized vehicle use. Opportunities exist to improve conditions by repairing, re-routing, or closing roads.

Goal 2. Provide for a variety of life through management of biologically diverse ecosystems.

Objective 201: During the planning period conserve existing hardwood communities and restore historic hardwood communities by 10% Forest-wide over 1995 conditions on sites capable of supporting these communities.

In 1995, there were 2,707 acres of hardwoods in the Project Area. Pine has encroached into hardwood sites and there are currently 2,242 acres. Opportunities exist to restore hardwood communities in the Project Area by removing pine from hardwood sites. This would maintain diversity in forest cover types for wildlife habitat, natural fuel breaks, scenery, and ecosystem health.

Objective 204: *Conserve and manage white spruce, lodgepole pine, limber pine and Douglas-fir.*

Approximately 175 acres of white spruce cover type exist in the Project Area. Spruce is also present in pine and hardwood stands as an understory or secondary component. No Douglas fir, lodgepole pine, or limber pine stands are mapped in the analysis area as separate stands. Phase I Amendment standards and guidelines preclude vegetation management treatments in spruce stands.

Objective 207: Manage at least 5% of the forested landbase for late succession.

Objective 208: Provide smaller late succession patches to meet specific resource elements.

The 5 percent identified for late succession management should include acres in Management Area 3.7, and smaller stands or patches identified in the Resource Information System (RIS) database. The Project Area does not contain Management Area 3.7 or any identified smaller stands or patches of late-succession forest as referenced in Objectives 207 and 208. Opportunities to provide late successional forest could be explored during development of silvicultural prescriptions.

Objective 209: *Manage at least 5% of the forested landbase for the grass/forb structural stage.*

In 1995, there were 225 acres of structural stage I grassland in the Project Area. There are currently 705 acres. This increase in the grass/forb structural stage in the Project Area will help meet this objective Forest-wide.

Objective 211: *In ponderosa pine forested portions of a watershed, maintain an average of 2 hard snags per acre on south-facing slopes and 4 hard snags per acre on north-facing slopes, well dispersed across the watershed through the rotation. Calculate as a per-acre average for the watershed; some acres may have no snags while others may exceed the average. In other forest types maintain an average of 6 hard snags per acre, well dispersed across the watershed.*

There are currently insufficient numbers of existing snags on north or east slopes to meet this objective. Revised Forest Plan direction also requires that for watersheds not meeting these standards, sufficient large green trees should be retained to provide future large-diameter snags (standards 2302 and 2306). The 7th-level watersheds in the Project Area currently have sufficient trees at least 20" in diameter to provide large-diameter snags over time.

Objective 217: *Maintain habitat for game and fish populations at the State objectives in effect in 1996.*

The Project Area provides habitat for big game species such as deer, elk, and turkeys. High open road density and lack of forage currently compromise habitat value in the Project Area for deer and elk. There is an opportunity to increase habitat value by closing roads and creating forage through vegetative treatment. Little Spearfish Creek also provides habitat for both Brown and Brook trout.

Management actions should be designed to recognize the recreational value of this fishery and maintain existing habitat.

Objective 218: *Conserve or enhance habitat for resident and migratory non-game wildlife.*

Objective 220: *Conserve or enhance habitat for federally listed threatened, endangered or proposed species.*

Objective 221: *Conserve or enhance habitat for sensitive species and species of special interest (management indicator species).*

The bald eagle is the only threatened, endangered, or proposed species known to use the general area. The species has not been observed in the Project Area. There are no known traditional roost sites in the Black Hills. No other threatened, endangered or proposed species or their critical habitats are known to exist in the Project Area.

Five animal species and two plant species listed by the Rocky Mountain Region of the Forest Service as “sensitive” have been documented in the Project Area. Habitat for other sensitive and management indicator species exists in the Project Area.

There is a need to conserve or enhance habitat for these species and an opportunity to do so through thinning, fuel reduction, prescribed fire, and transportation system changes.

Objective 223: *Use management ignited fires and prescribed natural fires to achieve desirable vegetative diversity and fuel profiles on 8,000 acres [across the National Forest] per year for the next decade.*

Objective 224: *Reduce or otherwise treat fuels commensurate with risks (fire occurrence), hazard (fuel flammability), and land and resource values common to the area.*

Objective 227: *Manage 28,900 acres [across the National Forest] of activity fuels and 4,000 acres [across the National Forest] of natural fuels each year during the next decade, consistent with the need to protect life, property and natural resources from the threat of wildfire.*

Undesirable fuel profiles exist in parts of the Project Area. There is a need to reduce fuel accumulation in these areas and an opportunity to do so using prescribed fire and mechanical treatments. Years of fire suppression have increased the potential for large crown fires. There is a need to reduce this potential to protect critical plant and animal habitat, timber values, private land, and visual quality in the area. There are opportunities to reduce fuels and large fire potential through timber harvest, fuel treatments, and prescribed burning.

Objective 228: *Within planning units where outbreaks of mountain pine beetles could threaten management objectives, maintain or reduce acreage of ponderosa pine stands that are in medium or high risk condition for infestation.*

In the Project Area, 6,356 acres (46% of the pine acres) are at high risk of mountain pine beetle infestation, and another 5,085 acres (36% of the pine acres) are at medium risk.

Reduction of acres at high and medium risk is needed to minimize potential loss of resource values to mountain pine beetles. There is an opportunity to reduce the potential for infestation by thinning dense timber stands and conducting sanitation harvest.

Goal 3. Provide for sustained commodity uses in an environmentally acceptable manner.

Objective 303: Offer 838 MMBF of sawtimber and 21 CCF of roundwood per decade.

This objective applies to the entire Forest and has not yet been met for the current decade. There is a need to provide sawtimber and roundwood and an opportunity to do so through timber harvest.

Goal 4. Provide for scenic quality, (and) a range of recreational opportunities ... in response to the needs of Black Hills National Forest visitors and local communities.

Goal 401 Management Area 4.1: Emphasize non-motorized recreational opportunities.

The Revised Forest Plan directs that off-road motorized travel will be prohibited in Management Area 4.1, and that roads will “generally” be closed to motorized vehicles. A small part of the Geranium Project Area is in Management Area 4.1. There are open roads in this area and motorized off-road travel is available. There is a need to comply with Revised Forest Plan direction.

Goal 401 Management Area 4.2A: Emphasize visually appealing landscapes such as vista openings, rock outcroppings, and diversity of vegetation.

The Revised Forest Plan identifies the management of fire and fuels through control practices and prescribed fire to protect biological and scenic values. There are heavy fuel loads in portions of the Little Spearfish Canyon that could be treated to minimize the effects of a wildfire.

1.3.2 Purpose of and Need for Action

In summary, the purpose of and need for action in the Geranium Project Area is to provide a sustainable supply of commercial timber consistent with Revised Forest Plan standards and guidelines, reduce hazardous fuels, maintain or enhance plant and wildlife habitat, improve management of the transportation system, and improve riparian condition. Other Revised Forest Plan goals and objectives, such as those associated with scenic integrity and heritage resources, would be met through implementation of standards and guidelines.

1.4 Issues

1.4.1 Public Involvement

Public involvement in this project began in May 2003 when the Geranium project was listed in the Black Hills National Forest’s Quarterly Schedule of Proposed Actions. Public scoping was conducted in November 2003. Section 5 of this document contains a list of individuals and organizations contacted during preparation of this document.

1.4.2 Identification of Relevant Issues

The ID team identified issues relating to the proposed action based on input from Forest Service resource specialists, other agencies, organizations, landowners, and members of the general public. The Forest Service separated the issues into two groups: relevant (or “significant”, as directed by the Council on Environmental Quality (CEQ) regulations (40 CFR 1500.4(g) and 1501.7)) and non-relevant issues. The CEQ regulations for implementing NEPA require this delineation in Sec. 1501.7, “...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review...” Relevant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-relevant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) not related to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. A list of non-relevant issues and reasons regarding their categorization as non-relevant may be found in the project record.

The Forest Service identified six relevant issues raised during scoping. These issues include:

1. Effects of vegetative management on wildlife and plant habitat

There is a concern that proposed vegetative treatments could detrimentally affect wildlife and plant habitat.

Indicators: Condition of habitat for threatened, endangered, proposed, sensitive, and management indicator species.

2. Travel and access management

Proposed transportation changes have both negative and beneficial effects. There are concerns that road closures could increase wildfire suppression response times. But, the same road closures could benefit some wildlife species. To comply with the Revised Forest Plan, Management Area 4.1 and 4.2A should be closed to off-road vehicle use, with motorized travel limited to designated routes.

Indicators: Miles of roads open, closed and decommissioned; miles of road per square mile; deer and elk habitat effectiveness; condition of habitat for other species affected by open roads.

Road use restrictions could decrease opportunities for motorized recreation, but increase opportunities for non-motorized recreation.

Indicators: Miles and density of open roads.

3. Fuels and prescribed fire

Fuels reduction projects are necessary to lower fuel hazards and protect people, property and resources. Wildlife habitat could be enhanced through prescribed burning.

Indicators: Acres, type and location of proposed fuel treatments

Prescribed fire can escape and cause damage to private property and resources, as well as National Forest system lands and resources.

Indicators: Acres, type, and location of proposed prescribed fire.

4. Timber production

The proposed vegetative management actions can provide raw materials for the local wood products industry.

Indicators: Volume of commercial timber that would be produced.

5. Risk of Mountain Pine Beetle infestation

If dense pine stands are not treated, mountain pine beetle infestations could increase to epidemic populations.

Indicators: Acres of pine at low, medium, and high risk of beetle infestation.

6. Recreational trail use

Timber harvest activities occurring in close proximity to recreational trails could affect both the physical use of the trail and the quality of the recreational experience associated with its use. This includes horse and foot trails, as well as several miles of snowmobile trails.

Indicators: Acres, type, period of use, and location of proposed vegetative treatments; and proximity to recreation trails.

1.5 Decisions to be Made

This EA does not document a decision. The purpose of this document is to disclose the effects and consequences of proposed actions and alternatives. The responsible official will make decisions based on consideration of this analysis.

Decisions to be made for this project are:

- Should resource management activities such as timber harvest, timber stand improvement, transportation system management, fuel reduction, monitoring, and associated actions be implemented in the Geranium Project Area at this time?
- If so, where in the Project Area should these actions occur? What design criteria and mitigation measures should be applied?

2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes the proposed actions, the no action alternative, and alternatives not considered in detail. This chapter also compares the alternatives in terms of their environmental impacts and their achievement of objectives.

Chapter Contents

- 2.1 Description of the Alternatives, Including No Action
 - 2.1.1 *No Action Alternative*
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- 2.2 Mitigation and Design Criteria
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- 2.5 Alternative Development Process, Including Alternatives Considered but Eliminated from Detailed Study
- 2.6 Comparison of Environmental Consequences

2.1 Description of the Alternatives, Including No Action

This section describes the alternatives considered in detail.

2.1.1 No Action Alternative

The Forest Service Handbook (FSH) requires the Forest Service to study the no action alternative in detail, and to use it as a baseline against which impacts of action alternatives can be measured (FSH 1909.15, 14.1). Under this alternative, none of the specific management activities proposed in this document would occur. Ongoing activities such as recreation, fire suppression, and road maintenance would continue. Management activities analyzed under other environmental documents may still occur.

This alternative does not address objectives and needs for timber harvest, travel management, fuel reduction, or insect infestation.

2.1.2 Alternative A

Focus of Alternative A

Alternative A, the proposed action, involves vegetation management and associated activities that focus on production of wood fiber, reduction of hazardous fuels and mountain pine beetle risk, and management of the road system. The alternative would also benefit some wildlife species and establish exclosures to monitor riparian condition.

The fuel reduction treatments would occur both in association with silvicultural treatments and outside of proposed silvicultural treatments.

Approximately 11,250,000 board feet of sawtimber and wood products would be produced by this alternative. Sufficient large green trees would be available to provide future large-diameter snags and meet Revised Forest Plan snag requirements. Ongoing activities such as recreation, fire suppression, and road maintenance would continue to occur.

Stand-by-stand proposals are described in the project file. A comparison of alternatives can be found in Section 2.6.

Vegetative Treatments

The following vegetative treatments are displayed in Table 2 and Figures 2 and 3.

- ♦ **Commercial thinning.** Thinning of mature or pole-sized trees in pine stands would take place on 2,271 acres to retain the best trees under conditions that promote optimal growth. The stands would be commercially thinned from below to remove suppressed, defective, and excess trees. Undesirable trees greater than 9 inches diameter at breast height (DBH) could be sold commercially. Residual basal area (BA) would average 40 to 60 square feet per acre. Following the commercial thinning, timber stand improvement would be accomplished to remove defective and excess trees within the 1 inch to 9 inch DBH range to retain the best trees at desired densities.
- ♦ **Overstory removal.** The overstory would be removed on 1,046 acres to allow the understory to develop. This would be the final harvest of the original stand and an improvement cut for the new stand. Where seedlings and saplings have become established, most of the mature trees would be cut to allow maximum growth of the new stand. Following removal of the overstory, defective and excess trees within the 1 inch to 9 inch DBH range would be removed to retain the best trees at desired densities.
- ♦ **Shelterwood seed cut** is proposed for 609 acres. These silvicultural treatments remove some of the mature trees to open the stand and allow young trees to regenerate and become established. Approximately 20 to 30 square feet of BA is retained to protect the regeneration from the climatic conditions. These treatments would retain enough large trees to provide a seed source and future large-diameter snags. Following removal of the mature trees, timber stand improvement would be accomplished in the stand to remove defective and excess trees within the 1 inch to 9 inch DBH range to retain the best trees at desired densities.
- ♦ **Shelterwood seed tree cut** is proposed for 297 acres. These silvicultural treatments are very similar to a shelterwood seed cut except it leaves fewer mature trees based on site variability. Seed trees are left to fill in spaces where regeneration is not established. These treatments would retain enough large trees to provide a seed source and future large-diameter snags. Following removal of the mature trees, timber stand improvement would be accomplished in the stand to remove defective and excess trees within the 1 inch to 9 inch DBH range to retain the best trees at desired densities.
- ♦ **Products-other-than-logs (POL) thinning** is proposed for 14 acres. Products other than logs are made from trees generally 5-9" in diameter. The primary objective of these treatments includes production of wood fiber and increased growth and vigor of the remaining trees to reduce risk of loss to pathogens. Suppressed, defective and

excess trees are removed. This treatment may be commercial or non-commercial, depending on the pulp and pole markets. Dominance is a desirable characteristic, and is taken into account during tree retention selection.

- ♦ **Hardwood enhancement** is proposed for 13 acres. This treatment is designed to encourage hardwood occupancy of the site. The primary hardwood species on this site is birch with some interspersed aspen. All conifer trees would be removed, and the site would immediately shift to hardwood species.
- ♦ **Aspen enhancement** is proposed for 7 acres. The primary hardwood species on this site is aspen. All conifer trees would be removed, and the site would immediately shift to aspen. Encroaching pine would be removed to prevent succession of these aspen stands to pine.
- ♦ **Non-commercial thinning** is proposed for 40 acres. Dense pockets of small trees would be thinned, lopped, piled and burned. Cut trees and other fuels would be lopped into smaller pieces and piled. Concentrations of fuel would then be burned. These treatments would reduce density and height of fuel and potential fire intensity.
- ♦ **Sanitation.** Mountain pine beetle populations appear to be at low levels in the Geranium Project Area, but potential for infestation exists. If an infestation occurs, cutting of beetle-infested trees (sanitation) would take place where necessary in stands that are identified as being at a high risk of mountain pine beetle infestation. Each sanitation harvest proposal would be field reviewed by resource specialists before implementation and would comply with Revised Forest Plan direction and mitigation listed in Section 2.2. No new permanent roads would be constructed. Sanitation treatments would only occur in those stands that are not identified for silvicultural treatment in any alternative, and are at high risk for mountain pine beetle infestation. This would include stands that have been deferred from treatment for other resource reasons, such as goshawk habitat and the intent of the treatment would be to limit the effect of the mountain pine beetle attack and preserve the characteristics and integrity of the stands so they can provide future habitat needs.
- ♦ **Fuel Breaks** are proposed for 409 acres to establish a low fuel-loading zone adjacent to roadways and private land. Mechanical methods (chipping, mulching, etc.) would be used to treat trees less than 9 inch DBH. Leave trees would be spaced at intervals up to 20 foot by 20 foot and would reflect the range of diameters currently on the site, but emphasize leaving the larger better developed trees. Approximately 272 acres of the fuel breaks would overlap the commercial thinning (77 acres), overstory removal (100 acres), shelterwood seed cut (34 acres), shelterwood seed tree cut (50 acres), and products other than logs (11 acres) treatments. The remaining 137 acres would be outside the boundaries of these treatments.
- ♦ **Fuels Reduction** would occur on 2,363 acres and would involve either prescribed burning or mechanical treatment to reduce fuel loadings, and treat existing and generated fuels. Prescribed burning would be utilized to consume fuels on the ground and kill lower branches on some trees, reducing the chances of a wildfire getting into tree crowns in areas with heavy fuels on or near the ground, whereas mechanical treatment would be utilized in areas with small trees that serve as ladder fuels. Approximately 1,117 acres of the fuel reduction treatment would overlap the commercial thinning (869 acres), overstory removal (12 acres), shelterwood seed cut (144 acres), and shelterwood seed tree cut (92 acres) treatments. The remaining 1,246 acres would be outside the boundaries of these treatments. Additional fuels

reduction treatments would occur in association with silvicultural treatments as explained further in this document.

-The prescribed burns would use cool under-burns, allowing no more than 10% mortality in the overstory and up to 50% mortality in trees less than 9 inches DBH. A detailed prescribed burn plan would be prepared and approved prior to burning to address safety, escape fire contingencies and resource considerations.

-The mechanical treatments would include chipping and mulching to treat existing and generated fuels. Trees less than 9 inch DBH would be treated. Leave trees would be spaced at intervals up to 20 foot by 20 foot and would reflect the range of tree diameters currently on the site, but emphasize leaving the larger better developed trees.

- ♦ **Activity Fuels.** Treatment of logging slash after timber harvest is a provision of the standard timber sale contract. Mechanical treatment of these “activity fuels” would take place in all harvest units where fuel loading would exceed Revised Forest Plan direction.
- ♦ **Wildland Urban Interface and At Risk Communities.** Alternative A would treat fuels on approximately 290 acres designated as Wildland Urban Interface (WUI) and approximately 43 acres in a ½ mile wide buffer surrounding Savoy, an At Risk Community (ARC). (See USDA Forest Service 2001b and 2001c for a thorough discussion of WUI and ARC.) These acres are included within the fuel break and fuels reduction acres identified above.

Vegetative Treatments	Acres Treated
Commercial thinning	2,271
Overstory removal	1,046
Shelterwood seed cut	609
Shelterwood seed tree cut	297
Products other than logs	14
Hardwood enhancement	13
Aspen enhancement	7
Non-commercial thinning	40
Fuel breaks*	409
Fuels reduction*	2,363
Total vegetative treatments	7,069

* As explained in the above narrative, portions of these treatments overlap other treatments

Table 2. Vegetative Treatments - Alternative A

Transportation System and Travel Management

Objectives of proposed travel management include reduction of maintenance costs and negative effects on wildlife habitat, soils, and water while retaining a transportation system that meets current and future resource management needs. From a soil and watershed standpoint, the specific objective of road decommissioning and road storage is to control erosion by (1) decreasing the production, interception, and rapid transport

of runoff by restoring or augmenting the natural drainage of the road template; and (2) decreasing sediment transported to waterways. Measures may include addition, replacement, upgrade, or removal of existing non-functional drainage structures (e.g., culverts); ripping to remove ruts; re-contouring; installation of waterbars, or rolling dips; placement of slash and boulders; tree planting; and revegetating. Identified reconstruction and/or maintenance that is necessary for implementation of this project would be completed prior to use. Work on other roads will take place as funding allows. Transportation management changes are depicted in Table 3 and Figure 4.

- **New Construction.** Approximately 0.6 miles of new road would be constructed. This would be an extension of NSFR 134.3D to access a vegetative harvest treatment. The newly constructed road would be closed following completion of the project.
 - **Reconstruction.** Approximately 23.8 miles of existing road would be reconstructed. Reconstruction would consist mainly of adding drainage structures to prevent the road surface from becoming muddy, and adding or improving surfacing.
 - **Maintenance.** Minor maintenance would take place on approximately 17.3 miles of existing road. This would involve blading ruts, cleaning ditches, and other minor repairs where problems exist.
- ◆ **Travel Management**
- **Roads currently open changed to year-long closure.** Approximately 1.0 mile of NSFR that is open year-long would be closed year-long. This includes NSFR 105.1 H, which is already closed as a result of the Riflepit project, and NSFR 134.3D which would be closed because of riparian concerns.
 - **Roads currently closed year-long changed to closed seasonally.** Approximately 0.8 miles of NSFR currently closed year-long would be changed to a seasonal closure. These two roads (736.1 B and 736.1C) are not gated, but are effectively closed by vegetation. They would be reconstructed and utilized during vegetative harvest treatments, then seasonally closed.
 - **Decommissioning.** Approximately 0.8 miles of NSFR and 11.8 miles of unclassified road would be decommissioned. This includes approximately 5.4 miles of snowmobile trails that are located on unclassified roads. The trails would still remain open to snowmobile use. Two of the NFSRs proposed for decommissioning (733.1I and 733.1J) are located in Management Area 4.1 where the Revised Forest Plan indicates that roads are “generally” closed to motorized traffic. In addition, these two roads are heavily overgrown with vegetation and difficult to locate on the ground. The other NSFR proposed for decommissioning (225.1C) is also heavily overgrown and not discernable on the ground. Most unclassified roads in the Project Area would also be decommissioned (11.8 miles). These unclassified roads were not built or sanctioned by the Forest Service, have not been maintained by the Forest Service, and are not needed for access for multiple uses in the Project Area. Based on

available funding, the roads would be decommissioned in accordance with Forest Service roads management policies (FSM 7700).

Transportation System Road Improvements	Miles
New road construction	0.6
Road reconstruction	23.8
Road maintenance	17.3

Travel Management	Miles
Roads currently open year-long changed to year-long closure	1.0
Roads currently closed year-long changed to seasonal closure	0.8
Roads currently open seasonally changed to year-long closure	0.0
Roads decommissioned	12.6

Table 3. Transportation Management - Alternative A

Riparian restoration

- ♦ **Riparian area restoration.** Two test riparian exclosures would be constructed along Little Spearfish Creek and an unnamed tributary to Little Spearfish Creek. The location of the proposed riparian work is depicted on Figure 3. Two temporary riparian exclosures would be constructed to rest these areas from grazing pressure. Both areas combined total approximately 1.5 acres in size, and would be enclosed with electric fence. The exclosures would be monitored for 3-4 years. At that time, the results of the monitoring would be evaluated through the Stearns Park Allotment Management Plan revision, and any potential long-term modifications to grazing management would be analyzed in that document.

Figure 2. Vegetative Treatments (Silviculture) - Alternative A

Figure 3. Vegetative treatments (Fuels) & Riparian Restoration - Alternative A

Figure 4. Transportation management - Alternative A

2.1.3 Alternative B

Focus of Alternative B

Alternative B was developed to provide an alternative that emphasizes wildlife values. When compared to alternative A, alternative B would involve less commercial vegetative treatment and the units retained for treatment are those that would provide the largest increases in big game forage production. Alternative B would also retain more dense forest habitat than alternative A; with associated benefits to those species using that habitat. In addition, alternative B would remove conifers from more acres of aspen than alternative A, benefiting those species that utilize aspen habitat.

Alternative B would treat less structural stage 4B (mature, moderately dense trees) and 4C (mature, dense trees). This would increase security and thermal cover for big game species, and would benefit species associated with dense forest (black-backed woodpecker, three-toed woodpecker, brown creeper, etc.). The proposed silvicultural treatment involving new road construction would not occur and more roads would be closed to vehicular traffic. Less road construction and fewer open roads would increase wildlife habitat effectiveness.

The proposed fuel treatments identified under alternative B would reduce fuel loading similar to alternative A, but where alternative A would use mechanical treatment or prescribed burning to reach that objective, Alternative B would emphasize prescribed burning to benefit big game forage production. Similar to alternative A, the fuel breaks identified under alternative B would occur both in association with silvicultural treatments and outside of proposed silvicultural treatments. Approximately 213 acres of the fuel breaks would overlap the commercial thinning (29 acres), overstory removal (100 acres), shelterwood seed cut (34 acres), and shelterwood seed tree cut (50 acres). The remaining 60 acres would be outside the boundaries of these treatments. All of the 423 acres of the fuel reduction treatment would overlap the commercial thinning (263 acres), shelterwood seed cut (55 acres), shelterwood seed tree cut (61 acres) and aspen enhancement (44 acres) treatments. All of the 1,117 acres of prescribed burning would occur outside the boundaries of the other vegetative treatments. Alternative B would treat fuels on approximately 101 acres designated as Wildland Urban Interface (WUI) and approximately 18 acres in the ½ mile wide buffer surrounding Savoy, an At Risk Community (ARC). These acres are included within the acres identified above.

Similar to other analyzed alternatives, ongoing road maintenance, noxious weed management, grazing, and activities in ongoing timber sales would continue according to existing management plans. This alternative would produce approximately 6,250,000 MMBF of sawtimber and wood products. The riparian restoration identified under the proposed action would occur under this alternative. Sanitation treatments and activity fuels treatments identified for Alternative A would also occur under Alternative B.

The prescriptions identified for the various vegetation harvest treatments and fuels treatments would be the same as described under alternative A, but acreages would change. In addition, the mileages of road improvements and transportation

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management would change. The acres and miles associated with alternative B are reflected in Tables 4 and 5, and Figures 5, 6 and 7.

Stand-by-stand proposals are described in the project file. A comparison of alternatives can be found in Section 2.6.

Vegetative Treatments	Acres Treated
Commercial thinning	824
Overstory removal	798
Shelterwood seed cut	423
Shelterwood seed tree cut	244
Products other than logs	0
Hardwood enhancement	0
Aspen enhancement	98
Non-commercial thinning	0
Fuel breaks*	273
Fuels reduction *	319
Prescribed burning	1,117
Total vegetative treatments	4,096

* As explained in the above narrative, portions of these treatments overlap other treatments

Table 4. Vegetative Treatments - Alternative B

Transportation System Road Improvements	Miles
New road construction	0.0
Road reconstruction	20.6
Road maintenance	15.2

Travel Management	Miles
Roads currently open year-long changed to year-long closure	5.0
Roads currently closed year-long changed to seasonal closure	0.0
Roads currently open seasonally changed to year-long closure	11.8
Roads decommissioned	12.6

Table 5. Transportation Management - Alternative B

Figure 5. Vegetative Treatments (Silviculture) – Alternative B

Figure 6. Vegetative Treatments (Fuels) & Riparian Restoration - Alternative B

Figure 7. Transportation Management - Alternative B

Treatment Timing

The National Forest Management Act generally prohibits the harvest of stands before they reach their maximum growth rate (NFMA, 16 U.S.C. 1604(m)). Exceptions in the law allow the harvest of individual trees, or even parts or whole stands of trees, before this time to thin and improve timber stands and salvage damaged stands of trees (part m1 of the law). Further exceptions are allowed in order to achieve multiple-use objectives other than timber harvest (part m2).

Alternatives A and B would harvest some stands before their maximum potential growth rate has been reached. These harvest treatments are consistent with the exceptions provided in part m2 of the law, and include the following: non-commercial thinning, commercial thinning, hardwood enhancement, aspen enhancement, products-other-than-logs treatments, sanitation, and fuel treatments. These treatments are proposed to meet the Revised Forest Plan multiple-use objectives stated earlier in this assessment.

2.2 Mitigation and Design Criteria

Mitigation measures allow the project to:

- a) Avoid impacts altogether by not taking a certain action or parts of an action.
- b) Minimize impacts by limiting the degree or magnitude of the action and its implementation.
- c) Rectify the impact by repairing, rehabilitating, or restoring the affected environment.
- d) Reduce or eliminate the impact over time by preservation and maintenance operations during the life of the action.
- e) Compensate for the impact by replacing or providing substitute resources or environments.

(40 CFR 1508.20)

The standards and guidelines in Chapter 2 of the Revised Forest Plan have a similar function but apply to all areas of the Forest when implementing activities. Chapter 3 of the Revised Forest Plan includes measures that apply to specific management areas. Standards and guidelines from the Revised Forest Plan applicable as mitigation or design criteria would be specified in the Project Implementation Guide that will be prepared if an action alternative is selected. The implementation guide would also include site specifics not included in this environmental assessment to protect integrity of heritage sites and other sensitive features. Mitigation measures and design criteria additional to the Revised Forest Plan standards and guidelines are listed below. These measures would apply to either action alternative unless otherwise noted.

1) Forest Vegetation

- a) Pine regeneration would generally be protected during harvest activities except where forage production or non-pine species production is the objective of harvest (aspen and hardwood restoration treatments).

- b) Sufficient down woody debris would be retained in ponderosa pine treatment areas to meet Revised Forest Plan standard 2308. Natural downfall would be expected to meet this requirement.
- c) Provided there are no concerns related to riparian areas, noxious weeds, or sensitive plant species, the stands proposed for seed cuts and seed tree cuts would be logged in the summer or early fall if feasible. This is intended to increase regeneration success.
- d) To avoid affecting the mountain pine beetle research plot located in RIS site 0707020072, the District Silviculturist would participate in the layout of treatments in the unit.
- e) The project interdisciplinary team would be consulted and participate in the design and implementation of any sanitation treatments to identify critical resource concerns and avoidance areas.

2) Wildlife

- a) Fuels treatments proposed for RIS sites 0704070001, 0704070006, and 0705010059 in alternative A would leave at least 40% canopy cover for protection of marten connectivity habitat. This treatment is not identified under alternative B and this mitigation would not be required for that alternative.
- b) Under alternative A, a non-commercial treatment (RIS site 0706050033) is located approximately 150 feet south of a snail colony. To ensure the colony is not affected during project implementation, the colony would be flagged with a 150-foot buffer to protect the site from disturbance. This treatment is not identified under alternative B and this mitigation would not be required for that alternative.

3) Snags and Down Woody Material

- a) Existing snags would be retained unless they pose safety hazards to workers or the public. Where possible, any snags cut as safety hazards would be left on site rather than salvaged or skidded to landings. Timber sale contract provisions would be used to protect snags.
- b) If standard 2308 (retention of down woody material) were to conflict with direction regarding fuel loading or visual quality, standard 2308 would take precedence.
- c) Cull logs or felled cull trees greater than 10" in diameter would be left on site or returned to the site in stands where whole-tree skidding takes place to contribute to nutrient cycling and provide habitat for small wildlife species.

4) Sensitive and Other Rare Plants

- a) High quality sensitive plant habitat would be protected from disturbance during proposed activities. Locations of this habitat are specified in the "Geranium Project Area Botany Biological Evaluation" found in the project file. Timber sale layout personnel would consult this information and/or the district botanist prior to layout of units. Mechanical disturbance that may occur outside of treatment units (due to landing and skid trail placement) would be located outside of high quality plant habitat.

- b) To avoid affecting sensitive plants, a botanist would participate in the layout of treatments, and be contacted prior to any ground-disturbing activities or fuel treatments in the following RIS sites: 0705010002, 0705010004, 00706050032, 0706050033, 0706050034, 0704020040 and 0704020046.
- c) To avoid affecting sensitive plants and high quality sensitive plant habitat, a botanist would be consulted during project design and construction of the riparian restoration fence, and construction and closure of NSFR 134.3D. This would include assisting with development of the seed mix for reclamation of the new road construction.

5) Sensitive Species Contingencies

- a) One or more of the sites to be harvested as part of this project would be set aside after harvest unit preparation and marking. If 1) a sensitive species site or population or heritage site were discovered during implementation of the project and 2) it is necessary to leave un-harvested a portion of the timber sale in order to protect the site or population, all or part of the set-aside unit/s may be harvested to offset the lost timber volume. If the above conditions do not occur, the set-aside unit/s would be harvested as a small sale or through other means. The site/s to be set aside will be identified in the Decision Notice if an action alternative is selected.

6) Rangelands

- a) All pasture gates would be identified on Timber Sale Area maps and kept closed during the grazing season (June through October). Maintained fences would be protected during logging operations.
- b) Roads, landings, and slash piles would be located out of meadows and draw bottoms whenever possible to reduce loss of forage and to protect key grazing areas.
- a) Protect and maintain range improvements such as cattle guards, fences, spring development and water storage tanks for the duration of the proposed activities. These improvements would be identified on the sale area maps. Repair or replace any damage to range improvements resulting from implementation of project activities as appropriate. Timber sale purchasers are responsible for maintaining cattle guards put in place to facilitate timber sales for the duration of the timber sale contract period.

7) Noxious Weeds

- a) Guidelines to prevent the spread of noxious weeds for prescribed fire, road maintenance/rehab, and timber harvest activities are identified in the BHNF Weed Management Plan (approved January 18, 2003), and would be included, as appropriate, in all contracts and permits issued as part of this project.
- b) Where proposed activities would occur in areas infested with high densities of noxious weeds considered to be at high risk for spread, off-road equipment associated with the activity would be washed before leaving the site to prevent spread of weeds to adjacent National Forest and private lands. Known areas

meeting these criteria would be identified by District staff prior to completion of any timber sale contract associated with this project.

8) Water and Soils

- a) Mandatory management requirements found in the Watershed Conservation Practices (WCP) Handbook (Forest Service Handbook 2509.25) and State of South Dakota Best Management Practices (BMP) would be applied to proposed activities as needed for protection of soil and water.
- b) Under both action alternatives, NSFR 134.3D would be closed. Under alternative A, the road would first be reconstructed to facilitate timber harvest activities. To minimize effects to water and soils, the road reconstruction would include surfacing with large gravel such as 3" minus rock along the entire length of the road adjacent to the unnamed tributary to Little Spearfish Creek. Culverts and fill materials would be added to the three stream crossings. Fill material would consist of clean, coarse material, in order to minimize the amount of sediment added to the stream channel. Harvest operations would be completed within one year after the culverts and fills are installed. Within nine months after harvest operations are complete, the drainage structures and fills would be removed, and disturbed sites adjacent to the stream should be revegetated. Under alternative B, NFSR 134.3D would not be used for project activities and would be closed to vehicular traffic. This would include modifying existing stream crossings to prevent vehicle traffic and the surface of the road would be modified and revegetated as necessary to eliminate ruts, gullies, and sediment movement.
- c) Portions of RIS sites 0705010006, 0705010007, 0705010008, and 0705010009, are susceptible to slumping and have landslide potential. The Northern Hills District Hydrologist would be consulted prior to any vegetative treatments or ground-disturbing activities in these RIS sites to ensure project activities avoid these areas.
- d) Portions of RIS sites 0705010002, 0705010003, 0705010004, and 0705010059, are located on steep unstable soils. Low-impact harvest techniques such as skyline cable or tong-throwing equipment must be used in order to avoid heavy equipment traffic on these areas. The Northern Hills District Hydrologist would be consulted prior to any vegetative treatments or ground-disturbing activities in these RIS sites.
- e) RIS site 0705010001 is partially located in a meadow and is identified for fuels reduction. If this activity includes prescribed burning, the meadow would be rested from grazing for a portion or all of the following growing season to ensure regrowth of forage species, and low-impact control lines such as black lines or wet lines would be used. Slash piles scheduled for burning would be located out of the meadow.
- f) Many proposed activities would take place on soils identified by the Lawrence County Soil Surveys as having a high erosion risk. Therefore, the following special provisions, intended to minimize the amount of exposed bare soil, offsite transport, and soil displacement, would apply: (1) Heavy equipment shall avoid streams and swales, except to cross at designated points, build crossings, or do restoration work, or if protected by at least 1 foot of packed snow or 2 inches of

frozen soil, (2) Stabilize and maintain disturbed areas such as temporary roads, skid trails, and landings, during and following construction and harvest operations to ensure that erosion control measures (such as water bars) are installed where appropriate, and functioning properly, (3) Utilize harvesting and skidding methods that minimize the amount of soil displaced into piles or windrows, so as to leave soil intact and in place, and (4) Conduct prescribed burns when soil, duff, and large fuels are moist, in order to prevent detrimental soil heating. The specific areas with high erosion risk are identified in the project file.

9) Fuel Treatments

- a) Where the combination of existing fuel loading and slash resulting from non-commercial thinning would exceed Revised Forest Plan direction, slash would either be chipped, or piled and burned away from the remaining live trees.
- b) Prescribed burning would be implemented only under conditions defined in a prescribed burn plan. Each prescribed burn proposal would be reevaluated prior to completion of the burn plan. The intent of this review is to verify that site conditions are appropriate for each planned burn and that site-specific objectives can be met.
- c) In non-commercial thinning and fuelbreaks, mechanical treatment of fuels would be used if possible. Areas not treated mechanically would be hand thinned with the resultant slash hand piled, burned and the area rehabilitated.
- d) Where burning is used in association with commercial thinning vegetation treatments, tree mortality levels would be reduced by using site-specific low-intensity fire prescriptions.
- e) Whole tree yarding would be the preferred method of slash treatment for all harvest activities, except overstory removal treatments. If whole-tree yarding is used in overstory removal treatments, measures must be identified to protect the residual regeneration. This could include having the sale administrator designate all skid trails and directional felling of trees to skidding corridors. In overstory removal treatments adjacent to private property, whole-tree yarding would be used where feasible within 500 feet of the private property boundary to remove fuel loadings. Lop-and-scatter fuel treatment would be acceptable on individual stands that would meet the desired fuel loading objectives.
- f) Following burning activity on slopes exceeding 30%, if the ground cover is less than 60%, the area would be reseeded.
- g) Rehabilitation of slash pile sites would include site preparation and seeding to return the sites to productivity and control the spread of noxious weeds. Slash piles would be constructed outside of meadows and would be located to keep ash sediment, and debris out of drainage channels.

10) Recreation

- b) Snowmobile trails would be shown as improvements on timber sale area maps and protected during harvest operations. An evaluation of the potential for conflicts between logging and trail use would be made at the time of timber sale appraisal and contract preparation. If conflicts appeared likely between use of the snowmobile trails and specific logging units or haul routes, logging would be

restricted between December 1 and March 31 unless a logical and desirable alternative snowmobile route is identified. Only those units and/or roads that were in conflict would be restricted so that logging operations could proceed in the remainder of the sale area.

- c) Winter operations of timber sale units that necessitate skidding across a snowmobile trail but do not otherwise affect the trail may be allowed. Determination would be made on a case-by-case basis, with crossings permitted only at locations approved by the sale administrator and with proper cautionary signing installed by the timber contractor.
- d) Hiking trails will be shown as protected improvements on the timber sale maps. Project administrators will ensure protection of the trails during project implementation.
- e) Logging traffic along 222.3 will be prohibited due to the high volume of recreational traffic along this road. The width and condition of the road cannot safely accommodate both uses.
- f) Appropriate signing or other cautionary measures would be implemented in conjunction with all management activities to protect public safety. Implementation of these measures would be the responsibility of the person initiating the action (e.g., prescribed fire manager, etc.).

11) Heritage Resources

- b) All culturally sensitive areas, Traditional Cultural Properties, National Register of Historic Places eligible and potentially eligible heritage properties would be avoided with a 60 meter (200 feet) safety buffer. Other mitigation identified in the project file for each property would be required during implementation of the project. Heritage site locations or specific mitigation is not identified in this EA to protect site integrity.
- c) In the event culturally sensitive areas, Traditional Cultural Properties, National Register of Historic Places eligible and potentially eligible heritage properties cannot be avoided, or heritage resources are found during implementation of the project, the sale administrator would stop all activity and notify the district archeologist. Appropriate consultation with the State Historic Preservation Office (SHPO), Tribal Historic Preservation Offices (THPO), Native American Tribes, American Indians, and other applicable parties, as directed by Section 106 of the National Historic Preservation Act would be completed.

12) Scenery

- a) Within 300 feet of primary travel corridors (NFSR 105.1, 134.1, and 222.3; and established hiking and snowmobile trails), prescribed fire prescriptions would be designed to limit scorch height to 1-2 feet above ground level.
- b) If possible, skid trails and landing areas would not be utilized during wet soil conditions to minimize soil disturbance. Where soil is displaced, the area would be re-contoured to blend in with the adjacent slope, and seeded with native grasses.
- c) The non-commercial vegetative treatments adjacent to NFSR 222.3 would be irregularly shaped and/or the edges feathered to avoid creating strong straight lines between thinned and non-thinned areas.

- d) If possible, treatments adjacent to private lands would be designed to avoid creating strong lines between private and Forest Service boundaries.
- e) The Forest Landscape Architect would be consulted and/or participate in the design and implementation of all overstory removal treatments to ensure the treatments meet Revised Forest Plan scenic integrity direction.

2.3 Monitoring

The district interdisciplinary team would monitor implementation of alternative A or B. At least one interdisciplinary team meeting/field review would occur prior to the advertisement of any commercial timber sale to ensure that the objectives in this EA are carried through the layout phase of the timber sale. The Project Area would be monitored by the IDT during and following project implementation to ensure that objectives are met and mitigation measures are followed and effective. The final monitoring review would be conducted two years after a timber sale is closed. All interdisciplinary team field reviews would be documented and a final monitoring report completed after project implementation.

Some of the project implementation monitoring would be done by the timber sale administrator or other contract administrators. Other resource specialists would be involved in monitoring of specific mitigation measures relating to their particular resource area. Appendix C, the Monitoring Plan, includes details on what would be monitored, timing and frequency, purpose, and responsible party.

2.4 Consistency with Revised Forest Plan and Phase 1 Amendment

The Revised Forest Plan and Phase 1 Amendment contain direction in the form of forest-wide and management area goals, objectives, standards, and guidelines. Standards are limitations on management activities. Deviation from a standard requires a forest plan amendment. A guideline is a preferred course of action, and deviation is permissible if the responsible official documents the reasons for the deviation. Under the Phase 1 Amendment, certain guidelines are to be treated as standards (USDA Forest Service 2001a). Goals are broad, general statements of desired end results of management, and objectives describe measurable desired results to work towards achieving goals.

This project is within the scope of the Revised Forest Plan analysis, and contains no unusual or extraordinary features or circumstances. A full accounting of project compliance with Revised Forest Plan and Phase 1 Amendment direction is located in the project file. All action alternatives considered in detail meet Revised Forest Plan and Phase 1 Amendment direction.

2.5 Alternative Development Process, Including Alternatives Considered but Eliminated from Detailed Study

The project planning team developed the proposed action to meet objectives identified from a comparison of existing conditions and Revised Forest Plan direction. Timber

harvest, fuel treatments and transportation proposals were modified as a result of public scoping and refinement of resource condition information. This revised proposed action formed alternative A.

Alternative B was developed to provide an alternative that emphasizes wildlife values. It differs from Alternative A by retaining more dense forest habitat, enhancing more aspen stands, and emphasizing the production of big game forage. The silvicultural treatment involving new road construction was dropped from consideration and more roads would be closed to vehicular traffic.

The IDT also considered other alternatives. Following are brief descriptions of alternatives not considered in detail and reasons for eliminating them from detailed analysis.

No commercial timber output/emphasize the removal of smaller trees.

A comment was received suggesting no timber harvesting or other vegetative treatment. The same comment suggested that (1) no harvest or thinning be conducted in structural stages 4C or 4B, (2) no overstory be removed, and (3) no trees greater than 10" be harvested. The no action alternative responds to the concerns expressed in this comment, as no treatments are proposed under that alternative. Alternative B also partially responds to this comment, as that alternative would treat less structural stage 4B and 4C and involves less overstory removal than the other action alternative. Acceptance of this comment in its entirety was not considered, as that option would not meet the purpose and need for the project or the direction of the Revised Forest Plan management area goals and objectives.

Decommission the maximum amount of road.

A comment was received suggesting that an alternative be developed that only decommissioned roads, or decommissioned the maximum amount of road. An alternative that only decommissioned roads was not considered, as that option would not meet the purpose and need for the project or the direction of the Revised Forest Plan management area goals and objectives. Alternative B attempts to respond to this comment, as it would decommission and/or close the most miles of road, while still providing sufficient access to facilitate wildfire response and resource management needs.

Maintain sufficient road infrastructure to support multiple use.

A comment was received requesting an alternative that maintained sufficient road infrastructure to support recreational uses, fire suppression, and management access. Both action alternatives involve proposed road closures, and both are designed to maintain sufficient roads to facilitate multiple use management of the area. Alternative B would close and/or decommission the maximum miles of road. For further information refer to the roads analysis in the project file.

Change management area designations.

A comment was received suggesting changing all of Management Area 5.1 to 4.1 (Limited Motorized Use and Forest Products Emphasis). The same comment suggested designating all of structural stage 4C (Mature dense trees), as Management Area 3.7 (Late Successional Forest Landscapes). It was not necessary to change management area

allocations to achieve the purpose and need for the project, and absent a clear reason for a change of this magnitude, the decision maker elected to not analyze this alternative.

Emphasize forest health treatments.

Comments were received suggesting an alternative that emphasized forest health and reduced the total acreage classified at moderate or high risk from mountain pine beetle to 20 percent of the Project Area and/or treated all stands that are at moderate or high risk from mountain pine beetle. A comment suggested all stands at moderate or high risk of catastrophic wildfire should be treated. Both action alternatives involve proposals to reduce high and moderate bug risk areas and additionally reduce fuels to avoid catastrophic wildfire. Alternative A attempts to maximize the treatment of insect infested area and fuels treatment consistent with Revised Forest Plan direction. Further treatment to the levels indicated in these comments would have required a Forest Plan amendment and the decision maker elected to not pursue that option.

2.6 Comparison of Alternatives

Table 6 compares activities proposed under the alternatives. Figures are approximate. Treatment definitions and descriptions begin on page 12.

Activities by Alternative			
Activity	No Action Alternative	Alternative A	Alternative B
Vegetation Management Treatments			
Commercial thinning	0	2,271 acres	824 acres
Overstory removal	0	1,046 acres	798 acres
Shelterwood seed cut	0	609 acres	423 acres
Shelterwood seed tree cut	0	297 acres	244 acres
Products other than logs	0	14 acres	0 acres
Hardwood enhancement	0	13 acres	0 acres
Aspen enhancement	0	7 acres	98 acres
Non-commercial thinning	0	40 acres	0 acres
Fuel breaks*	0	409 acres	273 acres
Fuels reduction*	0	2,363 acres	319 acres
Prescribed burning	0	0 acres	1,117 acres
Transportation Management			
New road construction	0	0.6 miles	0.0 miles
Road reconstruction	0	23.8 miles	20.6 miles
Road maintenance	0	17.3 miles	15.2 miles
Roads currently open year-long changed to year-long closure	0	1.0 miles	5.0 miles
Roads currently closed year-long changed to seasonal closure	0	0.8 miles	0.0 miles
Roads currently open seasonally changed to year-long closure	0	0.0 miles	11.8 miles
Roads currently open that would be decommissioned	0	12.6 miles	12.6 miles

* Some fuels treatments overlap harvest treatments as explained under the discussion of each alternative

Table 6. Comparison of Alternatives

Table 7 discusses how each alternative responds to the issues. All figures are approximate.

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	No Action Alternative	Proposed Action (Alternative A)	Alternative B
Issue 1: Effects of Vegetative Treatment on Wildlife and Plant Habitat			
Threatened and endangered species	No Effect	No Effect	No Effect
Sensitive species	N/A	May adversely impact some individuals, but is not likely to result in federal listing.	May adversely impact some individuals, but is not likely to result in federal listing.
Management indicator species	N/A	Species dependent (see wildlife analysis)	Species dependent (see wildlife analysis)
Issue 2: Travel and Access Management			
Miles of road open year-long	53.5	40.9	37.1
Miles of existing road open seasonally	20.5	20.5	8.1
Miles of existing road closed yearlong	20.3	20.3	36.5
Miles of existing road decommissioned	0	12.6	12.6
Miles of road per square mile	3.3	2.7	2.7
Issue 3: Fuels and Prescribed fire*			
Acres of commercial Thinning, products other than logs thinning, and non-commercial thinning	0	2,325	824
Acres of fuels reduction	0	2,363	319
Acres of prescribed burning	0	0	1,117
Acres of fuel breaks	0	409	273
Acres of WUI treated	0	290	101
Acres of ARC treated	0	43	18
Issue 4. Timber Production			
Potential sale volume	N/A	11.25 MMBF Sawtimber and wood products	6.25 MMBF Sawtimber and wood products
Percent of Project Area identified for harvest treatment	N/A	24	13
Issue 5. Risk of Mountain Pine Beetle Infestation			
Acres of pine at risk of beetle infestation	Low 2,522 Medium 5,085 High 6,356	Low 6,329 Medium 4,047 High 3,587	Low 4,251 Medium 4,618 High 5,094
Acres of commercial thinning, products other than logs thinning, and non-commercial thinning	0	2,325	824
Issue 6: Recreational trail use			
Hiking trails	The project would not affect the total miles of hiking or snowmobile trails, but implementation of either action alternative would require mitigation to avoid negative effects on trail use (See Section 2.2).		
Snowmobile trails			

* Some fuels treatments overlap harvest treatments as explained under the discussion of each alternative.

Table 7. Response of the Alternatives to the Issues

3 ENVIRONMENTAL CONSEQUENCES

This section forms the scientific and analytical basis for the comparison of the potential environmental effects of the alternatives. In determining potential environmental consequences of each alternative, the interdisciplinary team considered the following:

- ♦ The probable consequences of each alternative on environmental resources
- ♦ Achievement of project objectives
- ♦ Adherence to Forest Plan standards, guidelines and objectives
- ♦ Compliance with federal and state laws and regulations

Chapter 3 of the Revised Forest Plan FEIS (Affected Environment and Consequences) discusses the short and long term effects, irreversible and irretrievable commitment of resources, and adverse environmental effects that cannot be avoided when implementing management practices in the Black Hills forest environment. The projects and effects described in this EA are the same as those anticipated by the Revised Forest Plan FEIS, and therefore the effects are not repeated here. This EA is tiered to Chapter 3 of the FEIS to avoid repetition and to allow this description to focus on the site-specific effects that would result from implementation of the proposed alternatives.

Chapter Contents

3.1 Cumulative Effects Area and Activities

3.2 Biological Consequences

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3.2.2 *Wildlife Habitat*

3.2.3 *Sensitive Plants*

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3.3 Physical Consequences

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3.4 Social Consequences

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3.4.2 *Scenic Integrity*

3.4.3 *Heritage Resources*

3.4.4 *Economics*

3.4.5 *Environmental Justice*

3.1 Cumulative Effects Area and Activities

For the majority of the resources analyzed for the Geranium project, the cumulative effects analysis area is the three 7th-level watersheds that overlap the Project Area, as illustrated in Figure 8. This area includes 17,449 acres of National Forest System lands and 581 acres of land in other ownerships. If analysis of a particular resource discipline

dictates a different cumulative effects area, that area is defined in the cumulative effects discussion for the involved resource.

Past actions. Black Hills forests have been subject to modification from their essentially untouched pre-settlement state since the 1870s. Forest vegetation has been altered by humans through timber harvest, fire suppression, introduction of exotic species, human-caused wildfires, development of private property and grazing by domestic livestock. As a result, more of the landscape is forested, though the trees are generally smaller (Parrish et al. 1996, USDA Forest Service 1996 p. III-136). The following timber sales have occurred in the area since 1990: Purgatory, Lone, Crowley, Breakneck, Central, Moonshine, and Rifle.

Current actions. Parts of the following Forest Service timber sales are currently under way in the cumulative effects analysis area: Plateau, Park, Rimrock, and Hellgate, and Hellox. Other ongoing activities include livestock grazing, road and utility maintenance, fuels management, fire suppression, water diversions for livestock, and recreational use. The principal recreation uses include snowmobiling, hiking, hunting, all terrain vehicle (ATV) use of trails and roads, and recreational driving. No mining operations of any size are currently active. Subdivision and development of private land, often involving road and utility construction, is taking place in some areas. Noxious weeds have increased in the Project Area as a result of all these activities.

Future actions. The current actions identified above are anticipated to continue into the future. It is also anticipated that there will be increasing emphasis on development of private land, vegetation management on Federal and other ownerships, road and utility maintenance, livestock grazing, fuel and fire management, and recreation. Proposed future USFS vegetation management projects adjoining the Geranium project are identified in Table 8. None of these projects are located within the three watersheds associated with the Geranium project.

Project	Location from Geranium Project	Scheduled Sale Date
Power	South	2004
Riflepit	Southwest	2005
Cement	West (in Wyoming)	2004/2005
Rubicon	North	2006/ 2007
West Rim	North and West	2006

Table 8. Future Actions Outside Cumulative Effects Area

Figure 8. Cumulative Impacts Analysis Area – 7th Level Watersheds

3.2 Biological Consequences

3.2.1 Forest Vegetation

This section summarizes the silviculturist's report (located in the project file), which contains data, research references and detailed analysis of effects on forest vegetation. Additional information on the vegetative resource is available in the sensitive plants, rangeland, and noxious weeds discussions later in this document. Project design features and mitigation measures discussed in Section 2.2 are intended to ensure that the project meets Revised Forest Plan direction.

Timber Production

The no action alternative would not harvest any timber volume. Alternative A would involve vegetative treatments on approximately 7,069 acres and produce an estimated volume of 11, 250,000 board feet of sawtimber and wood products. Alternative B would treat approximately 4,096 acres and produce an estimated volume of 6,250,000 board feet of sawtimber and wood products. None of the alternatives would affect long-term pine sawtimber productivity.

Any treatment that reduces stand density increases risk of trees being blown down by strong winds, especially when combined with heavy snow. Under both action alternatives, shelterwood seed cut, overstory removal, and shelterwood seed tree cuts would decrease BA substantially. These stands would be at increased risk of blowdown until root systems strengthen.

A description of the various harvest treatments is available in Section 2.1.2 of this document and in the Revised Forest Plan (USDA Forest Service 1996 p. II-33).

Stand Diversity

Under the no action alternative, stand diversity would be determined by natural events such as wildfire and insect infestation. Absent any disturbance, age class distribution would continue to move towards mature stages and away from younger stages.

Both action alternatives would improve the balance of ponderosa pine age class distribution by moving some stands from mature to younger age classes through regeneration harvest. Cover type distribution would remain the same.

Both action alternatives would decrease acreage in mature age classes, with alternative A having the largest decrease. There would be a corresponding increase in seedlings and saplings. The effect of this change would be a more open forest canopy in treated areas. Opening the canopy through timber harvest temporarily makes more sunlight, moisture and nutrients available to understory plants, and these plants (shrubs, forbs, grasses, and conifer seedlings) then can grow faster until competition or age slows growth.

Insects and Diseases

Revised Forest Plan objective 228 directs maintenance or reduction of ponderosa pine acres at medium or high risk for mountain pine beetle infestation. Stand risk ratings are based on stand structure, average stand diameter, and stand density. High-risk stands are single storied, have large average diameter and high density. Stand hazard ratings provide an indication of those stands most susceptible to initial beetle infestation. Table 9 displays the risk ratings for the project alternatives. Estimated figures immediately following harvest and in 2025 are identified.

The following assumptions were made in determining effects of proposed activities on mountain pine beetle risk: 1) non-treatment would result in an increase of one level by 2025; 2) immediately after treatment, a stand would have low risk of infestation; 3) stands that would be at high risk in 2025 if not treated would be at moderate risk in 2025 if treated; 4) stands that would be at low or moderate risk in 2025 if not treated would be at low risk in 2025 if treated; and 5) only non-fuel treatments were considered.

Pine acres by mountain pine beetle risk class and alternative, 2005 and 2025						
Risk Class	No Action Alternative		Alternative A		Alternative B	
	Existing	2025	Immediately following treatment	2025	Immediately following treatment	2025
Low	2,522	0	6,329	542	4,251	366
Moderate	5,085	2,522	4,047	5,787	4,618	3,885
High	6,356	11,441	3,587	7,634	5,094	9,712

Table 9. Mountain pine beetle risk

Currently 6,356 acres (45% of the area forested with ponderosa pine) are at high risk of mountain pine beetle infestation. An additional 5,085 acres (36%) are at medium risk. If no action is taken, high risk is projected to increase to 11,441 acres by 2025, while medium risk would decrease to 2,522 acres.

Both action alternatives would increase acres at low risk and reduce high and moderate risk acres immediately after harvest. This trend would carry forward into the future (2025), as both action alternatives would leave less acres at high risk as compared to the no action alternative. When compared to alternative B, alternative A would have the largest reduction in acres at high risk immediately after harvest and in 2025, because alternative A treats the largest number of acres.

Sanitation treatments could be utilized to treat stands with localized mountain pine beetle attacks. This treatment should further reduce the areas at moderate and high risk in 2025, but the actual affected area is hard to quantify because of the inability to forecast where and when these potential attacks could occur.

Cumulative Effects

The area has been modified by humans since the late 1800's by settlement, including road building, human or lighting fires, fire suppression, grazing, mining, and commercial and non-commercial timber harvest activities.

Timber management actions, affecting 4,592 acres, have occurred in the Project Area since 1990, including the Rifle, Lone, Breakneck, Central, Crowley, Purgatory and Moonshine sales. In addition, the Hellox, Hellgate, Plateau, Park and Rimrock sales are ongoing in the Project Area and affect an additional 2,405 acres. These sales have affected approximately 39% of the Project Area. Alternative A would involve silvicultural treatments on an additional 4,237 acres (23% of the Project Area), whereas alternative B would treat an additional 2,289 acres (13% of the Project Area). Because of the selective nature of the harvest associated with the previous or ongoing sales, and the proposals under the action alternatives, no cumulative effects on the vegetative resource are anticipated and the treatments are anticipated to promote forest health.

The continuous nature of the forest cover can allow crown fires to run for long distances under certain weather conditions. In the long term, the no action alternative would add to this effect and heavy fuel loading from snowstorms would remain a fire hazard. Alternative B and C would counteract this effect to a moderate degree by varying stand structure, decreasing ladder fuels and creating fuel breaks.

Cumulative effects on mountain pine beetle activity are not well understood. Little is known about the pre-settlement beetle outbreaks (Parrish et al. 1996). Modern silviculture attempts to reduce the risk of infestation, but outbreaks still would occur. Although both action alternatives would reduce the beetle risk in treated stands and may reduce the risk of spread, beetle outbreaks would still continue under all alternatives.

3.2.2 Wildlife Habitat

This section summarizes the wildlife biologist's report and biological evaluation/biological assessment, and the silviculturist's report located in the project file. The discussion in this section first addresses vegetation, followed by threatened and endangered species, sensitive species and management indicator species (MIS). Project design features and mitigation measures discussed in Section 2.2 are intended to ensure that the project meets Revised Forest Plan direction.

Vegetational Diversity

The Project Area is characterized by ponderosa pine cover type. Approximately 80% of the National Forest System land is in pine, with 13% in hardwoods and 6% in grass and meadows. Dominance of ponderosa pine is a natural condition in the Black Hills, but pine is probably more dominant now than it was historically (USDA Forest Service 1996, Parrish et al. 1996). Though a majority of the Project Area overstory consists of mature ponderosa pine stands, the aspen, birch, and regenerating pine that commonly occur in the understory contribute greatly to screening cover and forage for a variety of wildlife species.

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Forest structure is generally dominated by stands of mature pine at low to moderate density. Very dense stands of mature trees are less common. Pure stands of young trees are unusual, but most of the open stands have an understory of pine seedlings and saplings. Forest structural stages (SS) are described as follows:

- | | |
|---------------------------------------|----------------------------------------|
| SS 1: Grasses and forbs | SS 4A: Mature, open forest |
| SS 2: Seedlings and saplings | SS 4B: Mature, moderately dense forest |
| SS 3A: Young, open forest | SS 4C: Mature, dense forest |
| SS 3B: Young, moderately dense forest | SS 5: Late succession (“old growth”) |
| SS 3C: Young, dense forest | |

Diversity of existing overstory plant communities and structure is shown in Table 10.

Existing structural stage distribution by cover type										
Acres										
Habitat	SS 1	SS 2	SS 3A	SS 3B	SS 3C	SS 4A	SS 4B	SS 4C	SS 5	Total
Grass/ Shrub/ Rock	1,060	0	0	0	0	0	0	0	0	1,060
Hard- woods	102	1,208	295	163	5	269	200	0	0	2,242
Pine	563	456	74	82	65	3,413	7,751	1,559	0	13,963
Spruce	0	29	0	0	0	82	50	14	0	175
Totals	1,725	1,693	369	245	70	3,764	8,001	1,573	0	17,440

Does not reflect 9 acres where data is not available

Table 10. Existing structural stage distribution by cover type

Diversity of overstory plant communities and structure after implementation of alternative A or B is illustrated in Tables 11 and 12.

Alternative A structural stage distribution by cover type										
Acres										
Habitat	SS 1	SS 2	SS 3A	SS 3B	SS 3C	SS 4A	SS 4B	SS 4C	SS 5	Total
Grass/ Shrub/ Rock	1,060	0	0	0	0	0	0	0	0	1,060
Hard- woods	102	1,221	297	168	5	271	198	0	0	2,262
Pine	563	1,318	1,279	701	28	4,379	4,792	883	0	13,943
Spruce	0	29	0	0	0	82	50	14	0	175
Totals	1,725	2,568	1,576	869	33	4,732	5,040	897	0	17,440

Does not reflect 9 acres where data is not available

Table 11. Alternative A structural stage distribution by cover type

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Alternative B structural stage distribution by cover type										
Acres										
Habitat	SS 1	SS 2	SS 3A	SS 3B	SS 3C	SS 4A	SS 4B	SS 4C	SS 5	Total
Grass/ Shrub/ Rock	1,060	0	0	0	0	0	0	0	0	1,060
Hard- woods	102	1,221	312	163	5	269	207	0	0	2,279
Pine	563	1,003	838	214	52	3,427	6,276	1,553	0	13,926
Spruce	0	29	0	0	0	82	50	14	0	175
Totals	1,725	2,253	1,150	377	57	3,778	6,533	1,567	0	17,440

Does not reflect 9 acres where data is not available

Table 12. Alternative B structural stage distribution by cover type

Table 13 reflects the changes in structural stages associated with each alternative when compared to the existing situation. Both action alternatives would increase structural stages 2, 3A, 3B and 4A as a result of commercial harvest treatments. The largest structural stage reductions would be in 4B and 4C under both alternatives, with a 38% reduction in alternative A and a 15% reduction in alternative B.

Change in Structural Stage From Existing Situation Based on Alternative										
Acres										
Habitat	SS 1	SS 2	SS 3A	SS 3B	SS 3C	SS 4A	SS 4B	SS 4C	SS 5	
Alternative A	0	+875	+1,207	+624	-37	+968	-2,961	-676		N/A
Alternative B	0	+560	+781	+132	-13	+14	-1,468	-6		N/A

Does not reflect 9 acres where data is not available

Table 13. Change in Structural Stage From Current Situation Based on Alternative

Effects on Hardwood Habitat

Aspen, birch and oak are important components of Black Hills habitat diversity. Deer and elk browse aspen and birch, while ruffed grouse and various songbirds use hardwood habitat for feeding and nesting. Young aspen stands are also very important deer fawning habitat (Kennedy 1992).

Revised Forest Plan objective 201 directs Forest-wide restoration of historic hardwood communities by 10% over 1995 conditions. Data from 1995 reported 2,707 acres of hardwood cover types, whereas there are currently 2,242 acres of hardwoods in the Project Area. Alternative A includes hardwood and aspen enhancement on 20 acres while alternative B would involve 98 acres of aspen enhancement. These treatments would remove all pines from existing hardwood and/or aspen stands to create a more homogenous hardwood stand and prevent pine from taking over the sites, which would eventually happen without timber harvest or natural disturbance. The increase in hardwoods would move toward the direction identified in Revised Forest Plan objective 201.

Effects on Dense Conifer Habitat and Late Succession

Mature, dense conifer stands (structural stages 4C and 5) exist on about 9% of the Project Area. Alternative A would decrease acreage in mature, dense stands by 43%, whereas alternative B would involve a reduction of less than 1%. There is an additional 70 acres

of dense younger forest (3C) in the Project Area. Alternative A would decrease acreage in dense stands to 33 acres, whereas alternative B would reduce dense stands to 57 acres. The no action alternative would retain all dense stands.

The Project Area does not contain Management Area 3.7 (late succession forest landscapes). There are no late succession stands present in the Project Area, and none of the alternatives would change that condition. Thinning and fuel treatments would increase growth and decrease the likelihood that stands would be lost to insects or wildfire; these stands could develop closed-canopy late succession characteristics over time if future management retains the largest trees and promotes relatively high BA.

Effects on Snag Habitat

Snags are an important habitat component for many species. Primary cavity nesters such as the black-backed woodpecker excavate their own cavities in dead trees that have rotting heartwood. Secondary cavity nesters such as the white-breasted nuthatch use natural cavities or abandoned woodpecker cavities.

The following table displays the current average density of ponderosa pine snags (10" in diameter or greater, and over 25' tall) by aspect in stands of ponderosa pine cover type throughout the three 7th-order watersheds associated with the Project Area. Snag densities were calculated from available RMRIS tree data, although data is not available for all sites. Live trees with snag characteristics (such as dead tops) are not included.

Aspect	7 th Order Watershed		
	10120203040201	10120203040202	10120203040203
North or East	3 snags/acre	4 snags/acre	3 snags/acre
South or West	3 snags/acre	3 snags/acre	2 snags/acre

Table 14. Existing Pine Snags, 10" DBH and larger, 25' high or taller

As the above table indicates, there are currently insufficient numbers of existing snags on north or east slopes to meet Revised Forest Plan standard 2301. The standard indicates that an average of 4 snags per acre should be retained on north or east slopes within each watershed and an average of 2 snags per acre on south or west slopes within each watershed. Revised Forest Plan direction also requires that for watersheds not meeting these standards, sufficient large green trees should be retained to provide future large-diameter snags (standards 2302 and 2306).

No Action Alternative:

This alternative would have no effect on existing snags and would leave all existing live trees in place as potential future snag habitat. It would have no immediate effect on dense stands, which are potential habitat for sensitive species such as black-backed woodpecker. Short-term snag recruitment rates are likely to be greatest under this alternative since beetle-induced mortality of larger diameter trees is more likely in dense stands. Large trees, which may be killed by mountain pine beetle in the near term, may be fewer in the long-term under this alternative. The potential for wildfires would be higher in the untreated dense stands under this alternative. Wildfires could also create snags, but would also affect habitat for sensitive species not dependent upon snags.

Alternatives A and B:

Both action alternatives include treatments that would affect snag habitat recruitment and management. The overstory removal treatments proposed under both action alternatives would have the largest effect, as they would remove most large green trees in the treatment area. Other treatments would have less effect, as the prescriptions for these treatments would leave more large green trees.

Under the action alternatives, all snags would be retained unless they present a safety hazard (see mitigation, Section 2.2). Snags posing a safety hazard would be cut and retained on site, where they would add to the down woody component. All other existing snags would be left standing. There would be no designated areas in the Project Area that would allow the cutting of snags for firewood, so that activity is not anticipated to affect existing snags or snag recruitment. Road closures included in alternative A and, to a greater extent under alternative B, would further discourage cutting of snags for firewood.

Prescribed fire prescriptions would be designed to minimize the loss of existing snags during treatment, and also would avoid overstory mortality and the creation of snags. Consequently, the effect of prescribed burning on snags is considered minor.

The Black Hills Phase I Snag Implementation Guide (USDA Forest Service 2002a) was used to generate the results in Table 15. As the data indicates, both action alternatives would meet Revised Forest Plan direction for green-tree retention across the Project Area projected out 20 years in the future. Within the Project Area, a minimum of 4 live pine trees per acre over 20" in diameter (averaged across the watershed) would exist on north and east aspects and a minimum of 3 per acre on south and west slopes. Other diameter classes would also be represented across the watersheds to provide other sizes of snags and to provide 20" snags in the future.

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7 th Order Watershed	Alt. & Year	Aspect	Live Pine per Acre by 2" Diameter Class					
			10-12"	12-14"	14-16"	16-18"	18-20"	>20"
10120203040201	Existing	North	16	14	12	8	4	2
		South	29	23	16	7	3	2
	Alt. A: 2025	North	10	9	9	8	6	5
		South	19	15	15	10	6	4
	Alt. B: 2025	North	13	13	11	10	6	5
		South	24	22	18	11	6	4
10120203040202	Existing	North	14	13	12	9	5	3
		South	21	23	14	9	4	2
	Alt. A: 2025	North	8	7	9	8	6	7
		South	15	12	12	11	9	6
	Alt. B: 2025	North	13	8	10	8	7	7
		South	24	17	17	11	8	5
10120203040203	Existing	North	14	13	10	7	4	2
		South	21	19	13	7	3	2
	Alt. A: 2025	North	8	8	7	6	4	4
		South	14	14	11	7	4	3
	Alt. B: 2025	North	8	8	8	7	5	4
		South	15	15	12	8	4	3

Table 15. Post-Treatment Green Tree Retention on Pine Sites

The sanitation treatments would treat localized mountain pine beetle outbreaks which could reduce the amount of snags created by mountain pine beetle attacks. Because this treatment would not affect existing snags or green tree retention direction, the effects on overall snag numbers in the Project Area is anticipated to be minimal.

Cumulative Effects:

Historically, the number of snags in the Project Area has probably been reduced because of previous timber harvesting and firewood sales, where snags were often cut. Because of the current prohibition on cutting of standing snags unless they represent a safety hazard, the alternatives would add very little to this cumulative effect. The incremental change in cumulative effects under any alternative would be negligible.

Effects on Down Woody Material

Revised Forest Plan guideline 2308a requires retention of at least 50 linear feet per acre of logs at least 10" in diameter to help trap moisture, reduce soil movement, and provide wildlife habitat. Little quantitative data exists on the amount of down woody material currently in place in the Project Area, but field reconnaissance indicates that guideline 2308a appears to be met in virtually all forested stands.

The no action alternative would result in the most down woody material over time, since all available trees would eventually become down logs. To ensure that areas proposed for harvest under alternatives A or B are not lacking large, down woody

material in the future, cull logs greater than 10" in diameter would be left on site or returned to the site in stands where whole-tree skidding takes place (see mitigation, Section 2.2).

Threatened and Endangered Wildlife Species

Threatened and endangered species evaluated for this document were identified from the U.S. Fish and Wildlife Service (USFWS) list available on the internet (<http://southdakotafielddoffice.fws.gov/endsppbycounty.htm>; list dated January 7, 2004). The list for Lawrence County includes the whooping crane and the bald eagle. In addition, the American burying beetle is identified as potentially occurring throughout the entire State of South Dakota. The list was further refined for the BHNF by the USFWS to indicate that management on the Forest would not affect the least tern, whooping crane, or American burying beetle (Twiss 2003). The bald eagle is the only federally listed species that may occur in the Project Area. No other threatened, endangered, or proposed species, or their critical habitats, are known to occur in the Project Area.

Bald Eagle (*Haliaeetus leucocephalus*)

Bald eagles occur in the Black Hills mostly as winter residents or migrants, arriving in early November and leaving by April (USDA Forest Service 1996). There are no known traditional roost sites in the Black Hills (USDA Forest Service 2002b), but the ponderosa pine landscape does provide suitable roost structures. In the spring of 2004, an eagle was observed sitting on a nest in the southern hills outside the Forest boundary. The nest was abandoned shortly after discovery (Staab 2004). Bald eagle populations have been increasing nationwide in recent years. Nesting pairs in the lower 48 states have increased from 791 in 1974 to 6,471 in 2000 (<http://midwest.fws.gov/eagle/population/2000chtofprs.html>).

Direct and Indirect Effects

No nesting sites are known in the Project Area. Revised Forest Plan direction would ensure that stands being used by transitory roosting bald eagles are avoided. Vegetation treatment activities may remove trees that could serve as potential transitory roost sites, however, sufficient trees would remain to provide adequate transitory roost sites under both action alternatives. Based on this information, there will be no direct or indirect effects to bald eagles.

Cumulative effects

There are no bald eagle nesting sites in the Project Area and no direct or indirect effects on the species have been identified. The project would not result in an incremental impact on the species and no cumulative effects are anticipated.

Determination

There will be no effect on bald eagles because there are no nests in the Project Area, activities will avoid disturbance to transitory bald eagles, and sufficient potential roost trees remain following implementation of either action alternative.

Sensitive Wildlife Species

All Region 2 sensitive wildlife species that are known to occur or potentially could occur in the Project Area were considered in this analysis. The complete list of species appears in the wildlife Biological Assessment/Biological Evaluation, located in the project file. Only those species known to occur in the Project Area, or with suitable habitat in the Project Area, are discussed in this document. Table 16 identifies these species. Effects are discussed following the table.

Species	Potential Suitable Habitat In Project Area	Species Recorded in Project Area
American Marten	X	X
Northern Goshawk	X	X
Flammulated Owl	X	
Black-backed Woodpecker	X	X
American Three-toed Woodpecker	X	
Northern Leopard Frog	X	X
Black Hills Redbelly Snake	X	X
Mountain Sucker	X	
Cooper's Rocky Mountain Snail	X	

Table 16. Sensitive Wildlife Species recorded or with suitable habitat in the Project Area

American Marten (*Martes americana*)

The Revised Forest Plan BE (USDA Forest Service 1996, Appendix H) gives a thorough overview of the American marten distribution and life history and is incorporated by reference.

Martens show a preference for dense spruce stands that provide abundant near ground structure and lengthy fire return intervals (Buskirk 2002). Martens generally avoid habitats that lack overhead cover and are intolerant of habitat types lacking at least 30 percent canopy cover (USDA Forest Service 2001a). Potential marten habitat is identified in two areas within the Project Area. Track plate surveys conducted within the Project Area in May 2000 resulted in two positive indications of marten presence, with April 2002 surveys identifying one additional positive result. District records indicate four sightings in the Project Area.

The HABCAP model was used to compare Forest-wide marten habitat effectiveness values from 1997 with data from 2002. The yearlong effectiveness value remained stable at one percent. Forest-wide the current marten population is approximately equal to the number of animals released here during the 1980s and 1990s. Although considerable mortality and reproduction have likely occurred during the ensuing time period, it appears the marten population trend is relatively stable in the Black Hills. The habitat trend is also stable, indicating the Forest is meeting Objective 221 (USDA Forest Service 2004e). Feckske (2003) reports that at the rate martens colonize vacant habitat, the marten population in the Black Hills could be at carrying capacity. Potential factors regulating marten populations in the Black Hills include low prey abundance,

population saturation, a fragmented distribution of high quality habitat and/or high predator abundance.

Direct and Indirect Effects

The HABCAP analysis for the project illustrates little difference between any of the alternatives. This is probably because of the limited amount (175 acres) of high quality habitat (spruce) in the Project Area. The dense stands (3C and 4C) of ponderosa pine provide lower quality marten habitat.

The no action alternative would have the least effect on martens because the forest structure would continue to become denser, and dead and down woody debris would increase. Although, in the long term, these stands could stagnate and become more susceptible to insect infestation and stand-replacing wildfire. Under the action alternatives there would be little effect to high quality marten habitat, because the 175 acres of spruce in the Project Area would not be affected. Treatments under alternative A would reduce dense (3C, 4C) ponderosa pine stands by 713 acres, whereas alternative B would reduce these structural stages by 19 acres. None of the alternatives would involve harvest treatments in connectivity corridors. However, under alternative A, fuels treatments are proposed in three stands that provide connectivity between or adjacent to white spruce stands. Mitigation would be included to maintain 40% canopy cover in these connectivity corridors (see mitigation, Section 2.2). Considering that ponderosa pine habitat in the Project Area is already sub-optimal, white spruce stands are not being treated, and the small number of marten observations in the Project Area, management activities should not have an effect on population viability in the planning area.

Cumulative effects

Past timber harvest activities in spruce and dense pine stands, and slash treatments that reduced down woody debris may have previously negatively affected marten habitat. Conversely, fire suppression has probably allowed spruce stands to persist and expand. Continued fire suppression may add to the cumulative effect of increasing spruce acreage and potential habitat. Harvesting denser stands of ponderosa pine would have the cumulative effect of reducing or preventing pine stands from becoming dispersal corridors.

There are no other known present or proposed actions in the cumulative effects area that would further affect preferred marten habitat. Consequently, the incremental cumulative effect of this project would be non-existent to minimal.

Determination

The Project Area only provides sub-optimal habitat, probably for dispersing martens. Reducing dense stands of ponderosa pine may further reduce habitat suitability for dispersing individuals. However, following Revised Forest Plan direction, would maintain preferred marten habitat and marten viability Forest-wide. The 2003 Monitoring and Evaluation Report (USDA Forest Service 2004e) indicates Forest-wide population and habitat trend is relatively stable, indicating the Forest is meeting Objective 221. The project is not anticipated to change this situation. Therefore, the proposed action may adversely impact individuals, but is not likely to result in loss of viability in the Planning Area, nor cause a trend toward federal listing.

Northern Goshawk (*Accipiter gentilis*)

The Revised Forest Plan BE (USDA Forest Service 1996, Appendix H) and the Phase I Amendment BA/BE (USDA Forest Service 2001a) gives a thorough overview of the northern goshawk distribution and life history and is incorporated by reference.

Goshawks are adapted to forested habitats and nest in mature, dense pine, but also use other trees such as quaking aspen, Douglas fir, western larch, and grand fir. In the Black Hills, ponderosa pine is the only tree species known to provide nest sites. Nest sites are typically composed of mature to old-growth trees with relatively dense canopy. These stands have been characterized as having a minimum size of 20 to 30 acres. Nest trees tend to be relatively large. Surrounding each nest site is a Post-fledging Family Area (PFA) estimated at about 420 acres. These areas have a mosaic of large trees, large snags, mid-aged trees, small openings with a productive herbaceous understory, and coarse woody debris. This diversity is thought to be important for maintaining prey populations. Nesting activity begins in early March.

Goshawk surveys were conducted in the project area during 2002 and 2003. No new territories or nests were discovered. There is one known and/or historically active goshawk nest/territory in the Project Area. One additional area was determined to be suitable for a new territory. The known nest site was identified as possibly active in 1994. Surveys of the known nest site in 2002 and 2003 indicate the nest was not occupied during this period.

Two recent reports exist of goshawk nest vandalism in the northern Black Hills. This territory is located outside the Project Area. No nest vandalism is known to have occurred in the Project Area.

Direct and Indirect Effects

Direct effects could include mortality of nestlings, if active nest trees are cut prior to young birds fledging. Because no known nest trees would be cut and any newly discovered nests would be protected in accordance with Revised Forest Plan direction, the chance of direct mortality is negligible. Direct effects to adult birds are unlikely due to high mobility of the goshawk.

Neither of the action alternatives identify treatments in the PFA or the nest stand associated with the known territory, or in the area determined to be suitable for a territory. The no action alternative would have the least effect on goshawks, as it would allow many of the stands proposed for harvest to become more dense and provide more nesting habitat for goshawks, although in the long term, these stands could stagnate and become more susceptible to insect infestation and stand-replacing wildfire. Treatments under alternative A would reduce dense mature nesting habitat (3C and 4C) by 713 acres and 19 acres under alternative B. Although there are no known active nests in these stands, the habitat would become less suitable under alternative A than alternative B, because of the larger amount of treatment in alternative A. The proposed thinnings under either action alternative would indirectly modify overall habitat condition.

Monitoring indicates Forest-wide trends may be relatively stable to slightly decreasing, however, sample size may explain much of this change (USDA Forest Service 2004d). The Phase I Amendment BA/BE (USDA Forest Service 1996) has determined that following established standards and guidelines will allow viability to be maintained

across the Forest (USDA Forest Service 2001a). All proposed treatments in the Project Area are within revised Forest Plan direction established to protect viability of the goshawk.

Cumulative effects

Fire exclusion in the Black Hills has resulted in a more pine-dominated, continuously forested landscape. Timber harvest over the years has probably resulted in fewer large-diameter trees, less mortality, and more trees overall. None of the alternatives would involve vegetative treatments in the PFAs and there may be a positive cumulative effect as the stands within both PFA's are allowed to grow into a more desirable balance of structural stages. The no action alternative would continue the trend of increased continuity of forest cover, which would result in the loss of openings for foraging, but would increase nesting habitat. The action alternatives would involve more human disturbance in the Project Area and would have more potential to add to the cumulative effect of human activity on nesting and fledging goshawks. Snag retention and replacement measures included in the action alternatives would help assure a long-term supply of snags, also important as prey habitat. Proposed road closures would discourage cutting of snags for firewood. Because all new roads and some existing roads would be closed, proposed road construction and improvement would not add to cumulative effects of roading on goshawk habitat.

Determination

No management activities are proposed within known or identified suitable nest stands, or PFAs in the Project Area under any alternative. The no action alternative would preserve the most nesting habitat, whereas alternative A would reduce nesting habitat by 713 acres. Alternative B would have minimal effect on nesting habitat. However, these reductions would not occur in known goshawk territories. There is only one historical territory in the Project Area, and it has not been active since 1994. Revised Forest Plan direction would ensure that newly discovered nests found during project implementation are dropped from treatment and protected. The 2003 Monitoring and Evaluation Report indicates Forest-wide population trend appears relatively stable or decreasing due to loss of nests to fire. The report also indicates Forest-wide habitat trend has been relatively stable (USDA Forest Service 2004e). This project is not anticipated to affect that situation. Therefore, the proposed action may adversely impact individuals, but is not likely to result in loss of viability in the Planning Area, nor cause a trend toward federal listing.

Flammulated Owl (*Otus flammeolus*)

Flammulated owls prefer mature, open-canopy ponderosa pine forests with brush or saplings and avoid dense, young stands. The species also favors ponderosa pine and Douglas fir over mixed conifer and grassland communities (Hayward et al. 1994). They are almost entirely insectivorous and feed primarily on moths, beetles, and crickets. Preferred roosting habitat appears to be dense vegetation. Evidence suggests that it breeds in ponderosa pine forests in holes excavated by woodpeckers. Nesting generally occurs mid-May to early June and ends by late July. There are currently 11,765 acres of mature, open canopy ponderosa pine (structural stage 4A and 4B) within the Project Area .

The Forest monitors this species through the Rocky Mountain Bird Observatory (RMBO). RMBO observed at least two flammulated owls in the northern Black Hills in 2002 (Panjabi 2003). Those observations were a few miles east of the project area. Forest-wide owl surveys conducted in 2003 produced negative results at 135 flammulated owl calling stations (Fauna West 2003). Without further monitoring, this information is inconclusive on the presence or lack of an established flammulated owl population in the Black Hills. Based on published information, it is reasonable to expect that there is suitable habitat for flammulated owls in the Project Area.

Direct and Indirect Effects

Under the no action alternative, the forest would continue to grow more dense, decreasing the amount of open mature ponderosa pine stands (structural stage 4A and 4B) available as flammulated owl habitat. Natural tree mortality may increase snag numbers and increase nesting and roosting habitat. The risk of stand replacing wildfire, which would negatively affect flammulated owl habitat would increase.

Alternative A would reduce flammulated owl habitat (structural stage 4A and 4B) by 1,993 acres (17%) while alternative B would involve a 1,454 acre (12%) reduction. Thinning of the densely stocked stands would increase preferred habitat by increasing open mature stands. It would also eventually provide large-diameter snags. The effect on existing snag habitat would be minimal under both action alternatives, because all snags would be retained with the exception of snags cut for safety concerns. The sanitation treatments would treat areas infested with mountain pine beetles and decrease the amount of future snags created by beetle kill. Direct effects could include mortality to individual birds if occupied or active nest trees are felled for safety reasons.

Both action alternatives would close several miles of road, which would decrease disturbance in the Project Area. Decreasing disturbance would be anticipated to benefit the species. Alternative B would close the most miles of road and provide the most benefit to the flammulated owl. The new road construction identified under alternative A could temporarily increase disturbance to this species, but the road would be closed at project completion.

Cumulative effects

Fire suppression has decreased open habitats over time, and vegetation management has probably decreased density of large-diameter snags. The overstory removal treatments would further reduce open mature forest habitat. The action alternatives would help counteract cumulative effects on flammulated owl habitat through prescribed fire, some types of harvest, and mitigation to ensure that large-diameter trees and snags are present across the landscape. Proposed road closures would discourage cutting of snags for firewood. Because all new roads and many existing roads would be closed, proposed road construction and improvement would not add to cumulative effects of roading on wildlife habitat.

Determination

The project may adversely impact individuals, but is not likely to result in loss of viability in the Planning Area, nor cause a trend toward federal listing. While individuals may be lost if unknown nests are removed during project activities, only a small amount of nesting habitat would be harvested. By following established Forest

Plan Phase I Amendment direction that preserves snags and a balance of structural stages, viability Forest-wide would not be affected.

Black-backed Woodpecker (*Picoides arcticus*)

Black-backed woodpeckers are associated with montane coniferous forests (Bent 1939, Terres 1987). Black-backed woodpeckers excavate cavities and forage on wood-boring insects in areas with concentrations of dead and decaying trees and logs. Literature suggests a strong tie to insect infestations, post-fire conditions, and snag habitats for nesting, foraging and roosting.

Woodpecker studies have been conducted in the Black Hills in the last four years by the South Dakota School of Mines and Technology, the University of Wyoming, and the Forest Service Rocky Mountain Research Station. RMBO observed 24 black-backed woodpeckers in 2001, 134 in 2002, and 75 in 2003 (Panjabi 2004). The RMBO program highlights the importance of early-successional burns and late-successional forests to the black-backed woodpecker. Rumble (2002) confirms that beetle-killed areas are also important.

Habitats created by fire and insects are temporary. Black-backed woodpeckers have evolved with these conditions, and are known to have population growth increases that coincide with the events (Anderson et al. 2002). The amount of time this habitat is used varies, but population declines are expected relatively quickly after the initial increase in growth rates. Forest-wide, the above-average addition of recently burned acres and beetle-killed trees is likely creating more suitable habitat. Due to the amount of new habitat created and the number of birds observed, both the population trend and habitat trend appear to have been increasing for the black-backed woodpecker over the past several years (USDA 2004d).

Although there have been no recent large areas of beetle infestation or large burns in the Project Area, suitable habitat exists mainly in pockets of dense timber and beetle-killed trees.

Direct and Indirect Effects

The no action alternative would have no direct effects. Direct effects associated with the action alternatives could result in loss of nests if occupied nest trees are cut for safety reasons during timber harvest. Cutting of insect-infested trees and hazardous snags would reduce foraging habitat. Under the no action alternative, dense stands would increase along with a corresponding increase in the risk of mountain pine beetle infestation and stand replacing wildfires. Beetle infestations and stand-replacing fire would both create black-backed woodpecker habitat.

Alternatives A and B include treatments that would result in loss of large trees and reduction in stand density, with subsequent effects on nesting habitat. The effects would be more under alternative A because that alternative would treat more acres. Treatments under alternative A would reduce dense mature nesting habitat (3C and 4C) by 713 acres and 19 acres under alternative B. Approximately 930 acres of this habitat would remain in the Project Area under alternative A while approximately 1,624 acres would remain under alternative B. Both action alternatives would meet Revised Forest Plan direction to provide sufficient large-diameter green trees across the landscape that would provide snags for this species in the future. The sanitation treatments would

treat areas infested with mountain pine beetles and decrease the amount of future snags created by beetle kill. This would further reduce foraging substrate and potential nest sites. Thinning treatments would promote the development of larger-diameter trees, which would eventually provide large-diameter snags.

Both action alternatives would close several miles of road, which would decrease disturbance in the Project Area. Alternative B would close the most miles of road and provide the most benefit to the black-backed woodpecker. The new road construction identified under alternative A could temporarily increase disturbance to this species, but the road would be closed at project completion.

Cumulative effects

Fire exclusion has resulted in a more pine-dominated, continuously forested landscape. Timber harvest over the years has probably resulted in fewer large-diameter trees, less mortality, and more trees overall. The no action alternative would continue this trend, though susceptibility to insect infestations and stand-replacing fire would increase with stand density and stagnation; these events would increase habitat for black-backed woodpeckers.

Fire suppression would continue under all alternatives, and the type of burns proposed under alternatives A and B would most likely not result in the type of post-fire conditions most suitable as black-backed woodpecker habitat. Snag retention and replacement measures included in these alternatives would help assure a long-term supply of snags. Proposed road closures would discourage cutting of snags for firewood. Because all new roads and some existing roads would be closed, proposed road construction and improvement would not add to cumulative effects of roading on black-backed woodpecker habitat. In the absence of large fire or beetle events, the suitability of the Project Area for this species would change little under any alternative. The 2003 monitoring report (USDA Forest Service 2004e) indicates that recent fires and bug outbreaks are leading to a detectable increase in populations of black-backs Forest-wide, aiding in maintaining a viable population.

Determination

Although dense mature habitat in the Project Area would be reduced by 43% under alternative A, population and habitat trends Forest-wide are more influenced by fire and beetle infestations than the availability of dense mature ponderosa pine stands. Effects on Forest-wide population or habitat trend as a result of this project would be negligible. Species viability in the Planning Area should be preserved by suitable habitat being created by fire and insect damage, and not affected by project activities. Individual nest trees may be harvested during activities that may impact individuals but viability Forest-wide would be maintained. Therefore, the proposed action may adversely impact individuals, but is not likely to result in loss of viability in the Planning Area, nor cause a trend toward federal listing.

American Three-toed Woodpecker (*Picoides dorsalis*)

The Revised Forest Plan BE (USDA Forest Service 1996, Appendix H) gives a thorough overview of the American three-toed woodpecker distribution and life history and is incorporated by reference.

The three-toed woodpecker is primarily a cavity nester of coniferous forests, particularly spruce (Clark et al. 1989). Closed-canopy spruce stands are preferred for nesting (Weydemeyer and Weydemeyer 1928), though dense late successional pine stands are also used in the Black Hills. Panjabi (2001) observed the species in late successional pine stands, but only where white spruce was a prominent feature of the surrounding forest. Foraging occurs in areas with abundant dead and decaying trees infested with wood-boring insects, especially newly burned areas (Hutto et al. 1999, Murphy et al. 1998, DeGraaf et al. 1991). Snags are required for nest cavity excavation. Pine, aspen, spruce and cedar are used for nesting in various portions of the woodpecker's range. Three-toed woodpeckers are associated with burns and insect outbreaks. In a study of burned and unburned sections of lodgepole pine forests, more individual three-toed woodpeckers and more nests were found in burned sections than in unburned sections (Anderson 2003). Keller (1987) suggested that three-toed woodpeckers may be sensitive to forest fragmentation, but Haldeman (1980) found this species in coniferous forests with openings and in logged areas.

Similar to the black-backed woodpecker, this species is monitored through the RMBO. Other woodpecker studies have been conducted in the Black Hills in the last four years by the South Dakota School of Mines and Technology, the University of Wyoming, and the Forest Service Rocky Mountain Research Station. The RMBO observed 12 three-toed woodpeckers in 2001, 26 in 2002, and 44 in 2003 (Panjabi 2004). There is a strong relationship between three-toed woodpeckers and spruce, indicating the species preference for this habitat type in the Black Hills. The relative density estimate in spruce increased since 2002 (Panjabi 2001, 2003, 2004; USDA Forest Service 2004e). The Project Area contains little suitable habitat due to the scarcity of spruce, but the species may use beetle-infested pockets. It is similar to the black-backed woodpecker in that it reaches highest abundance in areas where insects are prolific. There are no recorded observations of three-toed woodpeckers in the Project Area.

Direct and Indirect Effects

Under the no action alternative, development of dense stands would increase risk of mountain pine beetle infestation. These conditions and development of ladder fuels would increase fire risk. Small wildfires could create three-toed woodpecker foraging and habitat, though stand-replacing fires could also destroy preferred habitat.

Spruce is the preferred habitat for three-toed woodpeckers, but no spruce stands would be treated under any of the management activities proposed under either action alternative. In addition, spruce is very limited in the Project Area (175 acres). Ponderosa pine three-toed woodpecker habitat is associated with dense mature stands (3C and 4C). Under alternative A dense mature habitat would be reduced by 713 acres and 19 acres under alternative B. Approximately 930 acres of this habitat would remain in the Project Area under alternative A while approximately 1,624 acres would remain under alternative B. Both action alternatives would meet Revised Forest Plan direction to provide sufficient large-diameter green trees across the landscape that would provide snags for this species in the future.

The sanitation treatments would treat areas infested with mountain pine beetles and decrease the amount of future snags created by beetle kill. This would further reduce foraging substrate and potential nest sites. Thinning treatments would promote the

development of larger-diameter trees, which would eventually provide large-diameter snags. None of these treatments would occur in spruce, the preferred habitat for the species, consequently effects would be minimal.

The transportation changes identified under the action alternatives would have similar effects as discussed above for the black-backed woodpecker.

Cumulative Effects

Fire exclusion has resulted in a more pine-dominated, continuously forested landscape. Timber harvest over the years has probably resulted in fewer large-diameter trees, less mortality, and more trees overall. The no action alternative would continue this trend, though susceptibility to insect infestations and wildfire would increase with stand density and stagnation; these events may increase habitat for three-toed woodpeckers. Snag retention and replacement measures included in these alternatives would help assure a long-term supply of snags. Proposed road closures would discourage cutting of snags for firewood. Because all new roads and many existing roads would be closed after vegetation treatments are completed, proposed road construction and improvement would not add to long-term cumulative effects of roading on three-toed woodpecker habitat. In the absence of large fire or beetle events, the suitability of the habitat in the Project Area for this species would change little under any alternative. The project alternatives are unlikely to impact three-toed woodpeckers in the Project Area or their population trend across the Forest.

Determination

The proposed action may adversely impact individuals, but is not likely to result in loss of viability in the Planning Area, nor cause a trend toward federal listing. The project would not affect existing spruce, the preferred habitat for the species. Although dense mature ponderosa pine habitat in the Project Area would be reduced by 43% under alternative A, population and habitat trends Forest-wide are more influenced by fire and beetle infestations than the availability of dense mature ponderosa pine stands. Effects on Forest-wide population or habitat trend as a result of this project would be negligible. Individual nest trees may be harvested during activities that may impact individuals but viability Forest-wide would be maintained. Species viability Forest-wide should be maintained by not treating preferred spruce habitat and by suitable habitat being created by fire and insect damage across the forest.

Northern Leopard Frog (*Rana pipiens*)

The Revised Forest Plan BE (USDA Forest Service 1996, Appendix H) gives a thorough overview of the northern leopard frog distribution and life history and is incorporated by reference.

Leopard frogs breed and are most abundant in small stock ponds and beaver ponds lacking predatory fish, and generally avoid faster moving water. They over-winter in permanent water that does not freeze solid and forage in upland sites where there is adequate cover. There are two small streams, several stock ponds, and other water sources throughout the Project Area that provide suitable habitat for the leopard frog.

Direct and Indirect Effects

Under the no action alternative, there would be no treatments that would modify frog habitat and no increase in vehicle traffic that could add to direct mortality. Motorized vehicles would continue to use the existing network of roads in the Project Area which could possibly result in direct mortality to frogs.

Vegetation treatments and transportation changes proposed under both action alternatives would involve disturbance that could result in the death of frogs, but with implementation of the WCPs and BMPs, the chances of this occurring would be small. Alternative A would increase foraging habitat (Structural stage 1 and 2) by 875 acres, whereas alternative B would increase this habitat by 560 acres. Thinning and harvest activities in upland foraging areas may make the frog more susceptible to predation if adult frogs disperse to water bodies that contain predatory fish (Smith 2003). Alternative B involves less timber harvest activity and should have less direct mortality from vehicle traffic than alternative A. Alternative A would involve reconstruction of NSFR 134.3D near an existing riparian area and would also involve three crossings of the stream at this location. Although the use of this road could result in vehicle traffic mortality, the road would be closed under both action alternatives and improve the existing situation. The effect of the road on reproduction should be negligible since the species reproduces in non-moving water. Proposed activities under either action alternative should not make northern leopard frog habitat unsuitable.

Cumulative Effects

Fire exclusion and other events have cumulatively altered historic riparian and wetland areas. None of the alternatives is likely to add to cumulative effects, and road closures may help counteract cumulative effects.

Determination

The project alternatives may adversely impact individuals, but are not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing. Mortality to individual frogs may occur due to harvest activities and machinery, and individual frogs may disperse to waters containing predatory fish. However, by following revised Forest Plan direction, there should be no loss of viability Forest-wide.

Black Hills Red-bellied Snake (*Storeria occipitomeoculata pahasapae*)

The Revised Forest Plan BE (USDA Forest Service 1996, Appendix H) gives a thorough overview of the Black Hills red-bellied snake distribution and life history and is incorporated by reference.

This species is found in moist woodlands with rocks, logs, leaf litter, and other cover. Red-bellied snakes often hibernate in rocky areas and may be killed on roads that run between rocky hibernation sites and riparian woodlands. The red-bellied snake hides in and under ground litter, understory vegetation, coarse woody debris, and abandoned ant mounds. This species feeds on slugs, earthworms, and soft-bodied insects, and is inactive from November through March (Behler and King 1979).

According to the SD Natural Heritage database and district records, no red-bellied snakes have been observed in the Project Area prior to this year. Project level surveys

for the snake were conducted in May, June, and July 2003 with negative results. Survey methods included overturning coarse woody debris and disturbing pockets of dense ground litter and understory vegetation at random locations. The IDT hydrologist made one observation in Project Area in May 2004.

Direct and Indirect Effects

The no action alternative would have no effect on red-bellied snakes, although the existing high road density probably results in roadkill of snakes. In the long term, lack of management or natural disturbance could reduce habitat diversity.

Road traffic, harvest activities, and prescribed fire associated with alternatives A and B could also kill snakes. Alternative A would involve reconstruction of NSFR 134.3D near an existing riparian area and would also involve three crossings of the stream at this location. In May 2004, the IDT hydrologist observed a red-bellied snake near this location. Based on the timing of this observation, the reconstruction of NSFR 134.3D may be between a foraging area and a hibernaculum, although there is no known or documented hibernaculum in the area. The presence of a hibernaculum in this area could not be confirmed. Although the use of this road could result in vehicle traffic mortality, the road would be closed under both action alternatives and improve the existing situation. The project would comply with Revised Forest Plan standard 3116.

Closure of roads under alternative B and to a lesser extent alternative A would reduce the chances of vehicle-caused mortality of snakes on these roads. Attempts to escape from prescribed fire could result in mortality due to predation and roadkill.

Both action alternatives would involve aspen and hardwood enhancement treatments (alternative A 20 acres and alternative B 98 acres) that would remove conifer trees from hardwood sites. This cover type may receive more use by red-bellied snakes than other habitat types. Although the treatment is not anticipated to affect habitat suitability for this species, logging machinery and falling trees could increase soil compaction and reduce habitat suitability (Smith 2003b).

Cumulative Effects

Fire exclusion has resulted in a more pine-dominated, continuously forested landscape. The no action alternative would continue this trend. Alternatives A and B would counteract effects of prior management to some degree by small-scale reintroduction of fire, reduction of stand density, and road closures. These changes would benefit red-bellied snakes. Project activities may cause additional direct injury/death from heavy equipment or personnel in addition to any direct injury/mortality occurring due to increased traffic along system roads used by logging vehicles. Four individual snakes were found dead on BHNF roads in 2002 (USDA Forest Service 2004d), indicating increased vehicle traffic during logging activities may result in higher mortality. The incremental cumulative effect of this project is not anticipated to detrimentally affect red-bellied snakes or their habitat.

Determination

Project activities may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing. Proposed treatments in both action alternatives may cause direct mortality to individual snakes

however, following Revised Forest Plan direction and BMP's would maintain viability Forest-wide.

Mountain sucker (*Catostomus platyrhynchus*)

Mountain sucker populations in the Black Hills are the eastern-most extension of the species. It occurs most often in cool, clear mountain streams with moderate water velocities. Stream substrate associated with mountain sucker habitat varies widely and ranges from mud to sand, gravel and boulders, although cobbles are most common. This species is found on the stream bottom and is closely associated with cover, (exposed roots, undercut banks, log jams and boulders). Mountain suckers are benthic feeders and their diet is primarily simple plants like diatoms and green algae, but small invertebrates are also ingested. Spawning occurs in the spring and a short migration may be made to spawning areas.

Historic surveys indicate the mountain sucker was widely distributed across the Black Hills (Evermann et al. 1986, Bailey et al. 1962, Stewart et al. 1964). The South Dakota Natural Heritage database records, and the 1995 and 1998 SDGF&P Annual Fisheries Report have not identified any mountain suckers in Little Spearfish Creek. Annie Creek is the single tributary within the entire Spearfish watershed that is known to have a population of mountain suckers (Erickson 2002). Annie Creek is tributary to Spearfish Creek and its watershed and confluence are upstream of the Project Area.

Direct and Indirect Effects

The no action alternative would maintain existing aquatic conditions.

Vegetation management activities and transportation network changes associated with the action alternatives would cause short-term increases in sediment levels in Little Spearfish Creek. Compliance with Revised Forest Plan direction, WCPs and BMPs would avoid and minimize sediment input into the creek by providing adequate vegetative buffers and sediment traps. Because of the absence of mountain suckers in the Project Area, these increases in sediment are not anticipated to have an effect on the species or its habitat.

Cumulative Effects

The no action alternative would not implement any of the proposed treatments or activities, therefore no cumulative impacts would occur.

Cumulative impacts from alternatives A and B are associated with the incremental increase in sediments resulting from project activities. This is additive to ongoing sedimentation that may be attributed to existing disturbances, livestock grazing on private and federal lands and natural erosion. Given the small magnitude of effects and the lack of observations of mountain suckers in the Project Area, a reduction in mountain sucker numbers and distribution within the analysis area is not anticipated.

Determination

The proposed action alternatives would have no effect on the mountain sucker. This species is not documented in the Project Area. Sediment input into Little Spearfish Creek would be minimal and would not affect mountain suckers in Annie Creek. There would be no effects on Forest-wide population or habitat trend as a result of this project.

Project activities are not likely to result in loss of viability in the Planning Area, nor cause a trend toward federal listing.

Cooper's Rocky Mountain Snail (*Oreohelix strigosa cooperi*)

The Revised Forest Plan BE (USDA Forest Service 1996, Appendix H) gives a thorough overview of the Cooper's Rocky Mountain Snail distribution and life history and is incorporated by reference.

The project area includes suitable habitat but no documented colonies of the Cooper's Rocky Mountain snail. The species is loosely tied to calcareous soils, limestone outcrops, and north and east facing slopes. It avoids dry open areas. The snail primarily feeds upon partially decayed tree leaves and degraded herbaceous vegetation. Threats to this species include habitat loss due to road construction, grazing, logging and major forest fires (Frest and Johannes 1993).

Direct and Indirect Effects

The Cooper's Rocky Mountain snail has not been documented in the project area and no direct or indirect effects to the species are anticipated. Under alternative A, non-commercial thinning treatments are proposed near Little Spearfish Creek in an area that provides habitat for other snail species. The snail colonies associated with these other snail species would be avoided during project activities (see mitigation, Section 2.2). By avoiding this habitat, potential effects to any unknown Cooper's Rocky Mountain snails would be minimized. The likelihood of indirect impacts to unidentified snail colonies is negligible since previous survey work has not identified the species in the Project Area.

Cumulative Effects

Potential cumulative effects of this project on the Cooper's Rocky Mountain snail, would be minimal to non-existent, since the species has not been identified in the Project Area and known snail habitat would be avoided by all project activities.

Determination

The proposed action would have no effect on Cooper's Rocky Mountain snails. This species has not been documented in the Project Area and known snail habitat is avoided. There would be no effects on Forest-wide population or habitat trend as a result of this project. Project activities are not likely to result in loss of viability in the Planning Area, nor cause a trend toward federal listing.

Other Snail Species of Interest

Four snail species of concern listed in Forest Plan Standard 3103 were identified within the Project Area during surveys conducted in 1993. This included sites containing *Vertigo arthuri*, *Catinella gelida*, *Oreohelix strigosa n.* (subspecies) and *Discus shimeki*. In 1999, 3 of these same snail species were found in the Project Area (Frest et al. 2002). One vegetative treatment unit under alternative A is located approximately 150 feet south of a snail colony, but the area would not be directly affected by project activities. The snail colony will be located and flagged with a 150-foot buffer to assure no activities would occur near the snail site. No harvest activities are proposed under alternative B in the vicinity of any known snail sites.

Management Indicator Species

MIS can be used to indicate effects on a wider group of species that share similar habitat requirements. MIS can also be species of particular interest for other reasons, e.g. sensitive species or big game. The MIS discussed in this analysis were selected to represent the effects of management activities on those species relevant to this project.

MIS that occur or have suitable habitat in the Project Area, and may be affected by project activities include the American marten, black-backed woodpecker, American three-toed woodpecker, northern goshawk, brown creeper, Merraim’s turkey, mountain lion, pygmy nuthatch, white-tailed deer, and elk. Fish MIS that occur in the Project Area and may be affected by the project include the brook trout and brown trout. Since all of these species occur or have suitable habitat in the Project Area, and may be affected by the project, they will be analyzed as MIS.

Wildlife species that are not selected for MIS analysis include the bald eagle, Townsend’s big-eared bat, fringed-tailed myotis, Cockerell’s striate disc, osprey, Cooper’s Rocky Mountain snail, regal fritillary, mule deer, mountain goat, finescale dace, lake chub and mountain sucker. The project would have no effect on the bald eagle, Cooper’s Rocky Mountain snail or the mountain sucker and as a result, they were not selected for analysis. The bald eagle is discussed on page 48, Cooper’s Rocky Mountain snail on page 61, and the mountain sucker is discussed on page 60. Townsend’s big-eared bat, fringed-tailed myotis, Cockerell’s striate disc, osprey, regal fritillary, mountain goat, finescale dace, and lake chub were not selected for analysis because neither they nor their habitat occur in the Project Area. Mule deer were not selected for analysis because effects on mule deer would be identical or very similar to the effects discussed for white-tailed deer and/or elk. Table 17 identifies the location in this document where each MIS is discussed.

Analysis Species	Page	Analysis Species	Page
American Marten	49	Mountain Lion	65
Northern Goshawk	51	Pygmy Nuthatch	66
Black-backed Woodpecker	54	White-tailed Deer	67
American Three-toed Woodpecker	55	Rocky Mountain Elk	67
Brown Creeper	62	Brook Trout	69
Merriam’s Turkey	64	Brown Trout	70

Table 17. MIS Discussion Locations in Document

Brown Creeper (*Certhia americana*)

Brown creepers are associated with denser mature coniferous habitat with dead trees, mixed deciduous woodlands, and mature forests. This species occurs in greatest density in white spruce and late successional pine habitat. Nests of twigs and mosses are built under loose bark of dead trees at least 10” DBH. Diet is composed of insects and larvae including weevils, leaf beetles, aphids, ants, caterpillars, moths, and spiders (Terres 1987). Optimal habitat in the Black Hills is spruce and pine structural stages 4B, 4C, and

5. There are currently 8,001 acres of 4B and 1,573 acres of 4C in the Project Area. There is no structural stage 5 within the Project Area.

Beginning in the 1960s, the Forest Service has participated in completing annual breeding bird survey (BBS) routes as part of a national program administered by the U.S. Geological Survey. BBS survey data specific to the Black Hills for the period 1966-2002 identify a positive 35.5% trend in the Forest-wide brown creeper population (Sauer et al. 2003). The accuracy of this trend estimate is affected by several concerns and the data may not be statistically significant.

Observations of the brown creeper have remained steady over the last three years of RMBO monitoring. The brown creeper is well distributed in low abundance throughout the Black Hills (Panjabi 2003, 2004). There were 153 observations in 2001, 145 observations in 2002 and 136 observations in 2003. The distribution and abundance of brown creepers appears to be closely tied to the availability of mature and old-growth stand conditions, as evidenced by the fact that 92%, 96% and 90% of all brown creeper observations in 2001, 2002 and 2003 respectively, were recorded at sites where the surrounding habitat was classified as either seral stage 4 or 5 (Panjabi 2001, 2003, 2004). The 2003 Monitoring Report (USDA Forest Service 2004e) indicates population trend data varied by year, but all years were within 10 percent of the average number of total annual observations (134). Based on the number of observations, populations appear relatively stable over the last three years.

Direct and Indirect Effects

The no action alternative would not alter preferred habitat (Structural stage 4B and 4C) of the brown creeper. This alternative would result in an increase in brown creeper habitat over time. It would also, however, allow continued development of ladder fuels and increases in risk of mountain pine beetle infestation. These conditions would increase the risk of severe wildfires. Stand-replacing fire would destroy brown creeper habitat in burned areas, and this habitat would not again be available until large-diameter trees and snags developed.

Alternatives A and B include timber harvest prescriptions that would result in loss of large trees and reduction in stand density. Alternative A would reduce structural stage 4B and 4C by 3,637 acres (38% reduction) and alternative B would decrease these structural stages by 1,474 acres (15% reduction). Alternative A has the greatest potential for negative effects on brown creeper. However, since commercial thinning, as proposed in this project, emphasizes retention and release of larger trees, growth rates in trees in treated stands would be more rapid than in untreated stands. Thus, the action alternatives would cause short-term losses in habitat availability, but if at least a portion of these stands were managed as late succession in the future, optimal habitat would be available on the landscape sooner than under the no action alternative.

Both action alternatives would meet Revised Forest Plan direction to provide sufficient large-diameter green trees across the landscape that would provide snags for this species in the future. Individuals could be affected if snags with occupied nests were cut during activities proposed under alternatives A and B. Only hazardous snags would be cut (see mitigation, Section 2.2), so effect is expected to be negligible. The sanitation treatments would treat areas infested with mountain pine beetles and decrease the amount of future snags created by beetle kill. This would further reduce potential nest

sites. Thinning treatments would promote the development of larger-diameter trees, which would eventually provide large-diameter snags.

Cumulative Effects

Historically, timber harvest and road building have decreased habitat for this species by removing large trees and snags, and preventing widespread natural mortality of large trees. The action alternatives would, in the short term, contribute to a downward trend in brown creeper habitat across the Forest. Because the project would retain some existing unharvested stands in the Project Area and contribute towards development of suitable habitat currently not available, none of the alternatives is expected to impact Forest-wide population trend.

Proposed road closures would discourage cutting of snags for firewood. Because all new roads and many existing roads would be closed, proposed road construction and improvement would not add to cumulative effects of roading on wildlife habitat.

Merriam's Turkey (*Meleagris gallopavo merriami*)

Merriam's turkey's habitat includes coniferous, deciduous, and mixed woodlands (Tallman et al. 2002). Selected habitat during the summer is open ponderosa pine (Structural stage 2, 3A, 3B, 4A, 4B), while winter habitat is dense ponderosa pine (3C and 4C). Poults tend to select meadow/forest edges and are seldom observed more than 10 meters from the forest edge (Rumble 1990). Roost trees selected by Merriam's turkeys are typically large diameter older trees with flat tops and large horizontal branches (Rumble 1992). During the summer, turkeys consume grasses and grass seeds as primary food categories, with brome grass seeds being the most common. During the winter, ponderosa pine seeds are consumed where available. Poults consume large quantities of invertebrates (Rumble 1990).

Direct and Indirect Effects

The no action alternative would allow for the continued increase of dense ponderosa pine canopy cover that may provide more wintering habitat. This alternative could also increase mature/overmature trees that are preferred for turkey roosting. Continued canopy closure resulting from this alternative may reduce preferred habitat in summer, when turkeys tend to select more open canopy ponderosa pine cover.

Both action alternatives propose vegetation management activities that would alter turkey habitat. No direct effects would be anticipated under either alternative because of the mobility of the species. Indirect effects from alternative A would include a reduction of dense canopy (structural stages 3C and 4C) ponderosa pine by 713 acres, resulting in less preferred winter habitat. Alternative B would reduce this same habitat by 19 acres. Both action alternatives would maintain turkey roosting trees by maintaining at least 2-6 suitable trees per acre in accordance with Revised Forest Plan Guideline 3205 (see Table 15 on page 47). Alternative A would increase preferred summer habitat (structural stages 2, 3A, 3B, 4A, 4B) by 713 acres and alternative B would increase preferred summer habitat by 19 acres.

Cumulative Effects

Turkey populations are monitored through South Dakota Department of Game, Fish and Parks (SDGF&P). Estimates of turkey populations show a doubling of turkey

populations between 1998 and 2002, growing from 9,000 birds to 18,500 birds respectively (USDA 2004d) and an estimated 19,000 birds in 2003 (SDGF&P 2004a). Forest-wide population trend is increasing. Both action alternatives should provide a mix of open and closed ponderosa pine stands that support Forest Plan Objective 217 and ensure population viability and increasing population trend in the Project Area and Forest-wide. Both population and habitat trend data suggest the Forest is meeting Objectives 217 and 221 (USDA Forest Service 2004e). Forest-wide turkey populations and habitat will be unaffected by this project.

Mountain Lion (*Felis concolor*)

Mountain lions typically occur in remote, undisturbed areas, including mountainous habitat, watercourses with sufficient cover, riparian woodlands, and rough broken country with rocky cliffs or ledges (Higgins et al. 2000). Home range size varies with season of year, prey distribution and density, and an individual lion's age and sex.

White-tailed deer and mule deer are the most important prey item (Fecske 2003), and mountain lions often follow the seasonal migration of this species. Other important foods include elk, bighorn sheep, hares, other small mammals, and porcupines, which mountain lions favor despite their quills (Higgins et al. 2000). Mountain lions have few enemies besides humans, and mortality usually results from hunting or control of lions preying on livestock. Although numbers are reduced from historical times, mountain lions are currently expanding in parts of their range. The indicated probable range for South Dakota is conservative, since mountain lions appear to be expanding eastward from the Black Hills and surrounding counties. On the Forest, the mountain lion population is stable to upward and prey habitat has been stable to increasing (USDA Forest Service 2004e).

Direct and Indirect Effects

Direct effects are not foreseen under any of the alternatives due to the lion's mobility and apparent avoidance of human presence and activities. The no action alternative would not improve habitat for mountain lion prey species and may impact the mountain lion negatively. If the action alternatives result in increases in deer and elk populations, there could be an indirect beneficial effect on mountain lions. Both action alternatives indicate improvements in summer habitat capability for these mountain lion prey species (see Tables 18 and 19, page 68).

Cumulative Effects

While no population objective is established by SDGF&P for mountain lions, the population is reported to be stable to upward. Although a HABCAP model is not available for the mountain lion, models indicate a stable to increasing habitat capability for prey species (USDA 2004d). This project meets Forest Plan Objectives 217 and 221 for maintaining, conserving and enhancing habitat for game species and MIS. Increases in mountain lion prey species habitat capability could also result in positive effects for mountain lions. The project is not anticipated to detrimentally effect species viability or the Forest-wide upward population trend.

Pygmy Nuthatch (*Seiurus aurocapillus*)

This species has a strong preference for yellow pine forests, although they have also been found in pinyons, junipers, and other pines (Terres 1987). The pygmy nuthatch feeds almost exclusively in pines and typically seeks static insect food in needle clusters, cones, twigs, branches, and trunks. Because the pygmy nuthatch nests primarily in dead pines and live trees with dead sections, it prefers mature and undisturbed forests that contain a number of large snags. Pygmy nuthatch abundance correlates directly with snag density and foliage volume of the forest, but inversely with trunk volume, implying that it needs heterogeneous stands with a mixture of well-spaced, old pines and vigorous trees of intermediate age (Ghalambor 2003). They require large diameter snags (at least 17" DBH) for excavation of nest sites (Raphael et al. 1984). Kistler and Fager (1981) estimate territory size at 2.5 acres. Habitat in the Project Area suitable for the pygmy nuthatch would be structural stage 4A with numerous large snags and a grass understory. Within the Project Area, there are 3,764 acres of habitat structural stage 4A, however the habitat is probably not optimal because of a lack of large diameter snags.

The pygmy nuthatch was selected as an MIS for this project because of its association with mature ponderosa pine seral stages. Other selected MIS are also indicators for mature ponderosa pine seral stages and provide good determinations for Forest-wide trend. These other species include black-backed woodpecker, brown creeper, and goshawk. According to the Black Hills National Forest FY 2003 Monitoring Report (USDA Forest Service 2004e), goshawk populations appear relatively stable or slightly decreasing due to habitat lost to wildfires, brown creeper populations appear relatively stable or slightly decreasing, and black-backed woodpeckers are increasing. The relationship of this project to these Forest-wide trends is addressed earlier in this document and should be used to supplement this discussion for the pygmy nuthatch.

Direct and Indirect Effects

Under the no action alternative, the forest would continue to grow more dense and the amount of preferred habitat (structural stage 4A) would decrease. More snags may be created due to natural succession, insects and disease. Alternative A would increase preferred habitat (Structural stage 4A) by 968 acres while alternative B would increase the same habitat by 14 acres. Increases in structural stage 4A habitat and its benefit to pygmy nuthatches would be contingent upon the recruitment of snags for nesting. Both action alternatives would prohibit cutting of snags except those presenting a safety hazard (see mitigation, Section 2.2). Both alternatives would meet Revised Forest Plan direction to provide sufficient large-diameter green trees across the landscape that would provide snags for this species in the future. The sanitation treatments would treat areas infested with mountain pine beetles and decrease the amount of future snags created by beetle kill. Thinning treatments would promote the development of larger-diameter trees, which would eventually provide large-diameter snags.

HABCAP analysis for the pygmy nuthatch indicates a decrease in summer habitat effectiveness for alternative A and an increase for alternative B. Both action alternatives decrease winter habitat effectiveness, with alternative B having less effect than alternative A. Direct effects are assumed to be minimal because the species is rarely observed on the Forest and the lack of observations in the Project Area. Road

construction proposed under alternative A could temporarily increase disturbance of this species, but all new roads would be closed to motorized vehicles except when access is needed for proposed timber harvest and other activities. Road closures proposed under alternative B and to a lesser extent under alternative A would decrease disturbance across the Project Area.

Cumulative Effects

The pygmy nuthatch is a rare bird in the Black Hills. From 2001 to 2003, RMBO monitoring resulted in five sightings. BBS data indicates one record for the species between 1992 and 2002. In addition, Forest Service biologists observed pygmy nuthatches on two occasions during the spring of 2003 (USDA Forest Service 2004e). Survey-wide estimates of all BBS routes suggest pygmy nuthatch populations are stable, although this data is based on a small sample size. Where long-term data are available for the species, natural fluctuations in populations numbers have been documented. It is suspected that these fluctuations may be due to intolerance of cold winter temperatures and/or a lack of a food source as a result of poor cone crop (Ghalambor 2003).

Habitat Forest-wide appears to be stable or decreasing slightly (USDA 2004d). Since this project would retain most snags (see mitigation, Section 2.2) and would leave some unharvested areas of mature trees, effects on Forest-wide population or habitat trend would be negligible. Reducing suitable habitat during project activities may decrease the likelihood of pygmy nuthatch occurrence, however, following Revised Forest Plan direction for snag retention, and structural and age class diversity should ensure species viability in the planning area and Forest-wide.

White-tailed Deer (*Odocoileus virginianus*) and Rocky Mountain Elk (*Cervus elaphus*)

White-tailed deer inhabit a variety of forest types and other habitats including grasslands, agricultural lands, deserts, swamps, and urban settings (Higgins et al. 2000). In the Hills, open stands and grasslands are utilized for forage. Dense pine stands are used for winter cover and escape cover during hunting seasons, while spruce and aspen stands are used for summer thermal and hiding cover. Results from a Black Hills deer study (Kennedy 1992) indicates that aspen stands are highly selected during fawning season. Abundant forage on the summer range can help the deer enter the winter months in better condition. Diet consists of agricultural crops, grasses, forbs, leaves, twigs, fruit, and acorns. Important browse species in the Black Hills are bur oak, chokecherry, Oregon grape, serviceberry, sumac and snowberry.

The Black Hills white-tailed deer population has generally increased since 1997, except for a decrease in 2001 due to drought and a localized outbreak of epizootic hemorrhagic disease.

Elk habitat is variable, with meadows and brushy open areas used for forage and denser timber used as cover. Grasses, sedges, and forbs comprise the summer diet, while twigs, leaves, and grasses are utilized in the winter (Higgins et al. 2000). The species may migrate between higher and lower elevations, but in the Black Hills, most areas are used year-round. The majority of the Project Area is mapped as summer range and/or annual range (SDGF&P, 2004).

Direct and Indirect Effects

Habitat effectiveness is an area’s capability to support deer or elk based on amount and spatial distribution of forage, cover, and open roads. The Revised Forest Plan identifies standards for minimum acceptable values for habitat effectiveness. The HABCAP model was used to calculate habitat effectiveness for deer and elk in Management Areas 4.1 and 5.1(see standards 4.1-3201 and 5.1-3201). The other management areas either do not have identified values for habitat effectiveness (4.2A), or there are no identified treatments in the management area (3.32 and 5.6). Table 18 and 19 displays overall habitat effectiveness values by management area. Individual forage, cover, and distribution values are documented in the project file.

Deer and elk habitat effectiveness values - Management Area 4.1				
Species and Season	No Action Alternative	Alternative A	Alternative B	Guideline (Minimum)
Deer, Summer	.381	.384	.384	.410
Deer, Winter	.375	.375	.374	.350
Elk, Summer	.375	.375	.375	.390
Elk, Winter	.376	.372	.372	.360

Table 18. Deer and Elk Habitat Effectiveness Values - Management Area 4.1

Deer and elk habitat effectiveness values - Management Area 5.1				
Species and Season	No Action Alternative	Alternative A	Alternative B	Guideline (Minimum)
Deer, Summer	.492	.506	.517	.400
Deer, Winter	.443	.403	.434	.350
Elk, Summer	.480	.510	.515	.430
Elk, Winter	.453	.406	.445	.340

Table 19. Deer and Elk Habitat Effectiveness Values - Management Area 5.1

As indicated above, habitat effectiveness values for deer and elk summer are currently below values in Management Area 4.1. Under both action alternatives, deer summer values would increase and elk summer would remain at current levels. Neither alternative would move the Project Area further away from standards. Further treatment in the management area would have increased summer values, but there would have been a corresponding decrease in winter values. In addition, much of Management Area 4.1 is included in the area identified as a suitable goshawk territory and a minimal amount of vegetative treatment was identified in order to meet Revised Forest Plan direction for goshawks.

In Management Area 5.1 the Project Area is currently above habitat effectiveness standards. Although there are reductions in winter values under both action alternatives, all values remain above Revised Forest Plan standards

The HABCAP model was also used to compare Forest-wide deer and elk habitat effectiveness values from 1997 with data from 2002. Summer white-tailed deer habitat values increased from 54 to 61 percent, and winter values decreased slightly from 59 to 58 percent. Summer elk habitat values increased from 66 to 69 percent, and winter

values increased from 62 to 63 percent. This indicates that elk habitat has slightly improved or remained stable over the last five years (USDA Forest Service, 2004e). Forest-wide increases have been observed in both elk populations and habitat capability over the past five years and the Forest is meeting Objectives 217 and 221 (USDA Forest Service, 2004e). This project would not affect that situation.

Cumulative Effects

Previous timber management activity, private land development, and road construction have all affected both white-tailed deer and elk habitat. Timber sales have reduced cover values, but have also increased feeding values. Private land development has reduced forage and increased vehicle traffic. The high level of road density in the Project Area affects security areas for both species. Both action alternatives would reduce road density in the Project Area and enhance security for both species. The effects of implementing either action alternative would be cumulative to these effects, but would not have a negative cumulative effect on either species. The action alternatives may improve white-tailed deer and elk habitat and positively affect Forest-wide-viability. Neither action alternative would affect the current upward trend associated with these species.

Brook Trout (*Salvelinus fontinalis*)

Brook trout are an important game species that are not native to the Black Hills. They need cold, clean headwater streams and lakes. Brook trout management promotes natural reproduction in the wild versus hatchery supplementation. They are sensitive to water temperatures above 20°C for extended periods of time and degraded water quality, including low pH, low dissolved oxygen, and sedimentation. Brook trout spawn in the fall. The eggs are susceptible to mortality from sediment.

Within the Project Area Little Spearfish Creek is classified by the SDGFP as a both a brook and brown trout stream (SDGFP 1993). The creek is a highly valued recreational trout fishery. A Walk-in Fishery extends from NFSR 134.1 downstream to Timon Campground on NFSR 222.3. The other perennial stream in the Project Area is a 1.4 mile long unnamed tributary that flows into Little Spearfish Creek in Section 16, T. 4 N., R. 1 E. Most portions of the stream have excellent riparian cover and some reaches show small impacts from cattle grazing. The headwaters of this stream are on private land. No regular fish stocking is done on this tributary and it is too small and shallow to support brook and brown trout.

Direct and Indirect Effects

The no action alternative would involve no additional activity in the Project Area and would comply with Revised Forest Plan direction to maintain and conserve aquatic habitat. Under the action alternatives, activities that may impact water quality are avoided or minimized through the implementation of Revised Forest Plan direction and BMPs. Unavoidable effects from prescribed burning and road construction/reconstruction are localized or short-term in nature. Under the action alternatives, no additional instream structures are proposed that would impede the movement of fish or fragment habitat, therefore the distribution and mobility of these species would be unaffected. The action alternatives have the potential to improve aquatic habitat conditions primarily by road decommissioning that may reduce

sediment sources. Both action alternatives would meet Forest Plan objectives 217, 219, and 221 that are intended to maintain and conserve aquatic habitat conditions.

Cumulative Effects

The no action alternative would not implement any of the proposed treatments or activities therefore no cumulative impacts would occur.

Cumulative impacts from alternatives A and B are associated with the incremental increase in sediments resulting from project activities. This is additive to ongoing sedimentation that may be attributed to existing disturbances, livestock grazing on private and federal lands and natural erosion. Forest-wide brook trout populations and habitat will be unaffected by this project. The localized and short-term impacts would not affect the upstream portions of the 7th-level watersheds in the analysis area and these effects would be negligible or undetectable downstream of the Project Area.

Brown Trout (*Salmo trutta*)

Brown trout are an important game species and are not native to the Black Hills. Some stocking occurs, but they also reproduce naturally. They prefer clear, cold stream headwaters and lakes, although they can survive in deeper, warmer, slower waters than other trout. Temperatures of 22°- 28°C are lethal and non-turbid waters are required for egg survival. Spawning occurs in the fall. Management activities that cause changes in brown trout habitat include livestock grazing in riparian zones, channelization and sediment from roads and other ground-disturbing activities. Brown trout occupy Little Spearfish Creek in the Project Area, similar to the above description for brook trout.

Direct and Indirect Effects

See the above effects discussion for brook trout. Both species occupy similar habitat and effects are similar for both species.

Cumulative Effects

Brook trout and brown trout would be similarly affected by the proposed activities. See the above cumulative effects discussion for brook trout.

Migratory Birds

Many species of migratory birds are of international concern due to naturally small ranges, loss of habitat, observed population declines and other factors. The Black Hills National Forest recognizes the ecological and economic importance of birds, and approaches bird conservation at several levels by implementing: (1) Forest Plan objectives, standards and guidelines, (2) a Forest-wide bird monitoring program, and (3) site-specific mitigation and effects analyses for identified species of concern.

A variety of Forest Plan objectives, standards and guidelines further the conservation of migratory birds. Objectives describe desired resource conditions. The most relevant objectives for bird conservation are those relating to vegetation diversity, landscape structural diversity, snags and down woody material, riparian condition, habitat improvements, and disturbance processes (see Forest Plan objectives 201-232). Standards and guidelines are designed to help achieve those objectives, and are implemented at the project level. The most relevant standards and guidelines to

migratory birds are 2101-2109 (Forested Landscapes), 2201-2208 (Hardwoods and Shrubs), 2301-2308 (Snags and Down Woody Material), 2505-2508 (Proper Use or Residual Levels – Riparian/Uplands), 3101-3115 (Endangered, Threatened or Sensitive Species Protection and Management), and 3202-3212 (General Fish and Wildlife Direction).

Bird monitoring is conducted at the Forest-level to determine species distribution, abundance, and trend (Panjabi 2001, 2003, 2004). The monitoring is designed and conducted by the RMBO to provide statistically rigorous population trend data for at least 61 species that breed in the Black Hills. Trend data will assist the Forest in determining whether additional conservation measures are necessary.

Species of concern applicable to project level conservation are identified by many sources including the Endangered Species Act, the Regional Forester's sensitive species list, the Black Hills National Forest MIS list, internal and public scoping efforts, and the US Fish and Wildlife Service's Birds of Conservation Concern (BCC) 2002 publication (US Fish and Wildlife Service 2002). All of these sources and their respective species of concern except the BCC have been examined elsewhere in this document.

The BCC 2002 publication partitions North America into 37 bird conservation regions (BCRs). The Black Hills is included in BCR 17 – Badlands and Prairies. Of the 24 bird species found in BCR 17, eleven are duplicated on the Regional Forester's Sensitive Species list, and are evaluated in the Biological Evaluation if they have potential to occur in the BHNF. Eight species are not expected to occur in the BHNF due to lack of habitat. The remaining five species or their habitats have potential to occur in the BHNF, but only the golden eagle and the red-naped sapsucker or their habitat have the potential to occur in the Geranium Project Area. They are evaluated below for anticipated effects.

Golden Eagle (*Aquila chrysaetos*)

This species is a cliff and tree nesting bird that inhabits open country such as prairies, steep canyons, and savannas (Terres 1980). Contiguously forested habitats and areas lacking cliff structure such as those found within most of the Project Area are not preferred by golden eagles, but they may be included in a home range if suitable nesting or foraging habitat is interspersed. Eagles could forage within the larger meadows of the Project Area, or in adjacent private grasslands; however none have been detected during recent bird monitoring efforts (Panjabi 2001, 2003). Some meadow areas would be affected by proposed fuel treatments identified under both action alternatives. This would have a negligible positive effect on potential foraging habitat due to the small extent of the treatments that would enhance open conditions. No other vegetation treatments or access proposals would have any effect on the eagle or its habitat.

Red-naped sapsucker (*Sphyrapicus nuchalis*)

This species is associated with aspen groves and mixed pine/aspen (Tallman et. al., 2002). The Geranium Project Area contains 2,434 acres of aspen and many smaller mixed pine/aspen stands. Both action alternatives include aspen and hardwood enhancements (alternative A 20 acres and alternative B 98 acres), satisfying Revised Forest Plan objectives 201 and 218 and guidelines 2201 and 2204 (both treated as standards) and 2205. The RMBO documented 389 red-naped sapsuckers in 2001, 222 in 2002, and 245 in 2003 (Panjabi 2004). This baseline data indicates populations are

probably stable Forest-wide. One red-naped sapsucker was documented along a transect in the Project Area during 2003. Meeting Revised Forest Plan direction should increase suitable habitat for the red-naped sapsucker and ensure species viability in the Project Area and Forest-wide.

3.2.3 Sensitive Plants

This section summarizes the botanist’s report and biological evaluation (located in the project file), which contains data, research references and detailed analysis of effects on the botany resource. Project design features and mitigation measures discussed in Section 2.2 are intended to ensure that the project meets Revised Forest Plan direction.

The Geranium Project Area was surveyed for sensitive plants and high quality sensitive plant habitat during the 2002 field season. Other surveys were conducted for different projects falling within the Geranium project boundary during the 1980, 1994, 1995, and 2000 field seasons. Information from all surveys conducted within the project boundary was used in this analysis.

No Federally listed plant species occur in the Black Hills. Two plant species on the Forest Service Region 2 (R2) sensitive plant list have been documented in the Project Area, and habitat exists for 6 others. One additional species may have suitable habitat in the Project Area. Table 20 displays R2 sensitive plant species known to occur or with suitable habitat in the Project Area. Further information is included below in the discussions for each individual species.

SCIENTIFIC NAME	COMMON NAME	KNOWN TO OCCUR IN PROJECT AREA	SUITABLE HABITAT	HABITAT CHARACTERISTICS
<i>Aquilegia brevistyla</i>	small-flowered columbine	X	X	moist forest
+ <i>Botrychium lineare</i>	narrowleaf grapefern		?	variable
<i>Botrychium multifidum</i>	leathery grapefern		X	moist forest/riparian meadow
<i>Carex alopecoidea</i>	fox-tail sedge		X	riparian meadow
<i>Carex leptalea</i>	bristlestalked sedge		X	moist forest/riparian meadow
<i>Cypripedium parviflorum</i>	yellow lady’s slipper	X	X	moist forest/riparian meadow
<i>Lycopodium complanatum</i>	trailing clubmoss		X	moist forest
<i>Platanthera orbiculata</i>	large round-leaf orchid		X	moist forest
<i>Viburnum opulus</i> var. <i>americanum</i>	highbush cranberry		X	moist forest/riparian meadow

+This species may have suitable habitat in the Project Area and is discussed separately.

Table 20. R2 Sensitive Plant Species in the Project Area

In addition, there are 18 South Dakota state-listed and/or plant species of interest known to exist in the Project Area. Plant species of interest are plant species that are suspected to be locally rare, but do not meet the criteria for R2 sensitive species designation. Most of these 18 species and their habitat fall under the same general habitats as the majority of the R2 sensitive plant species and many are used as indicators of habitat for sensitive species. As a result of occupying the same habitats as sensitive

species, these species would be afforded the same protection as sensitive plant species and suitable sensitive species habitat.

Effects on Region 2 Sensitive Plants

Two R2 sensitive plant species (small-flowered columbine and yellow lady's slipper) are known to occur within the Geranium Project Area boundary, but not within any proposed treatment units in any of the action alternatives. Avoidance or mitigation would protect all identified high-quality sensitive species habitat.

Aquilegia brevistyla (small-flowered columbine)

Currently, there are 30 locations for this species on the Black Hills National Forest, with one large occurrence (containing 300+ individuals) located in the northeast portion of the Project Area (USDA Forest Service 2003). It is found in a variety of habitats; including spruce forest, mesic drainage bottoms, dry streambeds, and moist limestone cliffs. Although the plant is usually found on northerly aspects, it can occur on any aspect that allows for proper moisture and light requirements (USDA Forest Service 2003).

Direct and Indirect Effects

No treatments or disturbance are proposed in areas occupied by the plant or in known high quality habitat, and none of the alternatives would directly affect the species. Any proposed sanitation treatments would be precluded from known or potential habitat (see mitigation, Section 2.2). Where vegetation treatments or other activities are proposed in close proximity to sensitive plant occurrences or habitat, a botanist would participate in design and layout to avoid disturbing plants or habitat (see mitigation, Section 2.2). Project monitoring would also occur after project implementation (see Appendix C). Additionally, moist soils and riparian areas would be protected during timber harvest and road-building under BMPs and WCPs.

Indirect effects from the action alternatives include degradation of habitat by invasion of noxious weeds resulting from mechanical treatments, both from logging activities and fuel reduction activities. The mitigation measures for noxious weeds identified in Section 2.2 of this document are designed to minimize this potential effect.

Cumulative Effects

Soil disturbance, introduction of invasive species, and increased fuel loading, can negatively affect sensitive plant species and their habitat. Historical management activities in the Black Hills, including livestock grazing, road building, recreation, fire suppression, mining activities, water diversion, and near-extirpation of beaver have created changes in high-probability plant habitat, all of which have decreased suitability of many areas as habitat for sensitive plant species.

The no action alternative would continue to increase fuel loading and the cumulative effects associated with the suppression of fire. Lack of fire is likely to increase fuel loading, thus potentially intensifying wildfire susceptibility and behavior. Moist areas, including high-probability sensitive plant habitat, normally would not burn or would burn at low intensities; with excessive fuel loading, these areas could ignite and burn at unusually high temperatures, resulting in a loss of plant habitat or plant populations

(Graham et al 2004). Pine would continue to encroach into riparian meadows, and cause a decline in the suitability of this plant habitat to support sensitive plant species that prefer open riparian meadow communities.

Both action alternatives involve activities that would result in less fuel loading effects, but the activities would also increase the potential for the invasion of noxious weeds. Adherence to noxious weed mitigation (see Section 2.2) would reduce indirect and cumulative effects of weed encroachment.

Although negative impacts from implementing either action alternative are possible, they are expected to be outweighed by the beneficial effects of reducing the risk of devastating wildfires. The approach of managing to restore and preserve habitat for the long-term despite potential short term negative effects (weeds, loss of plant or wildlife individuals, or initial changes to habitat) is supported by the US Fish and Wildlife Service and the National Oceanic and Atmospheric Administration (USDI, etal. 2002)

The incremental change in cumulative effects under any alternative would be negligible.

Determination

The risk of adverse effects is low, because no populations of small-flowered columbine are known to exist in any proposed treatment areas. In addition, this species is well distributed across the Forest and many plant locations are inaccessible because of cliffs and/or steep slopes. As a result, the project alternatives could adversely impact individuals, but are not likely to result in a loss of viability in the planning area nor cause a trend toward federal listing.

Cypripedium parviflorum (yellow lady's slipper)

The yellow lady's slipper is known to be located on 50 sites within the northern portion of the BHNH (USDA Forest Service 2004b). Known plant locations in the Black Hills indicate that the species is associated with mesic conditions on limestone rock outcrop areas, often on north-facing slopes, and on mesic to saturated conditions in and adjacent to riparian areas, and is often associated with hardwoods (USDA Forest Service 2004b). Mergen (2003) found the yellow lady's slipper to occur in conifer-deciduous communities, deciduous communities and conifer (primarily spruce) communities. There is one large occurrence of this species located in the northeast portion of the Project Area. This occurrence has six known discrete patches and has approximately 80+ individuals (USDA 2003). In the Geranium Project Area yellow lady's slipper is often found with or in the same habitat as the small-flowered columbine (USDA 2003).

Direct and Indirect Effects

No treatments or disturbance are proposed in areas occupied by the plant or in known high quality habitat, and none of the alternatives would directly affect the species. Any proposed sanitation treatments would be precluded from known or potential habitat. See the above description of effects for the small-flowered columbine. Because of the similarity of habitat requirements for yellow lady's slipper and the small-flowered columbine in the Project Area, the impacts are similar.

Cumulative Effects

See the above description of cumulative effects for the small-flowered columbine. Because of the similarity of habitat requirements for yellow lady's slipper and the small-flowered columbine in the Project Area, the impacts are similar.

Determination

The risk of adverse effects is low, because no populations of yellow lady's slipper are known to exist in any proposed treatment areas. In addition, this species is well distributed across the Forest and many plant locations are inaccessible because of cliffs and/or steep slopes. As a result, the project alternatives could adversely impact individuals, but are not likely to result in a loss of viability in the planning area nor cause a trend toward federal listing.

Effects on other R2 sensitive species with habitat in the Project Area

The following species have not been documented in the Project Area, but suitable habitat is known to exist.

<i>Botrychium multifidum</i>	leathery grapefern
<i>Carex alopecoidea</i>	fox-tail sedge
<i>Carex leptalea</i>	bristlestalked sedge
<i>Lycopodium complanatum</i>	trailing clubmoss
<i>Platanthera orbiculata</i>	large round-leaf orchid
<i>Viburnum opulus var. americanum</i>	highbush cranberry

In the Black Hills, the primary habitat for these species is riparian communities and/or moist forested communities usually with a birch or spruce component. This is similar habitat to the discussions above for the small-flowered columbine and yellow lady's slipper. Although the Project Area has suitable habitat for the 6 species listed above, none of them were found within the project boundary during surveys. The focus of surveys was on locating individual sensitive plant species as well as identifying suitable habitat. Refer to Table 20 for the habitat category associated with each species.

Direct and Indirect Effects

The habitat for these 6 sensitive plant species, and the small-flowered columbine and yellow lady's slipper share many similarities. Refer to the above discussion of these two species for additional information.

Because the no action alternative does not involve any treatments or road proposals, it would have no direct or indirect effects on sensitive plant species or their habitats. No action would maintain sensitive plant species habitat and protect biodiversity in the short term.

The action alternatives both involve similar direct effects on sensitive plants. Following application of project mitigation (see Section 2.2), no known high quality suitable R2 sensitive plant habitat is included in any of the treatment areas and as a result, direct effects would be minimal.

Indirect effects are similar to those described above for the small-flowered columbine, but vary between alternative A and B because of the different number of acres associated with each alternative. The vegetative treatments proposed under both action alternatives should reduce the potential of a wildfire and its associated effects on

sensitive species habitat. Management that includes prescribed burning and selective thinning of adjacent conifer stands could maintain a mosaic of seral stages, increase available moisture and decrease the potential for widespread crown fires (Hornbeck et al. 2003). Alternative A would have the largest effect, since it involves the most acres of vegetative treatment. These treatments potentially could create new weed infestations, although the weed mitigation (see Section 2.2) should minimize this effect. The decreased risk of catastrophic fire most likely offsets other potential negative effects (USDI, 2002).

Both action alternatives involve removing ponderosa pine during proposed vegetative treatments in the Project Area. This could have a negative or positive effect on sensitive plant habitat depending on the magnitude and location of the treatment. Treatments could either expand or reduce available sensitive plant habitat.

Both action alternatives involve road decommissioning (12.6 miles). Road closures would have a beneficial effect to all plant communities and eventually, the closed roads would be expected to function like undisturbed areas (USDA Forest Service 1997). The new road (0.6 miles) proposed under alternative A would bisect a stream that provides suitable habitat for the fox-tailed sedge, but closure of the road and project mitigation (see Section 2.2) at project completion should minimize effects. The new road is located on an old previously constructed roadbed, and no known R2 sensitive species would be affected.

Cumulative Effects

See above cumulative effects discussion under small-flowered columbine and yellow lady's slipper. The riparian and moist forest sites occupied by these 6 identified plant species is similar to the habitat of the small-flowered columbine and yellow lady's slipper, and the cumulative impacts would be the same.

Determination

The risk of adverse effects to populations or habitat of leathery grapefern, fox-tail sedge, bristlystalked sedge, trailing clubmoss, large round-leaf orchid, or highbush cranberry is low, since (1) the Project Area was surveyed for sensitive species and suitable habitat; (2) all known high quality suitable habitat for sensitive plant species, with mitigation, would not be directly impacted; and (3) there is a small amount (8% of Project Area) of high quality suitable plant habitat. As a result, the project alternatives could adversely impact individuals, but are not likely to result in a loss of viability in the planning area nor cause a trend toward federal listing.

Effects on other R2 sensitive plant species with possible suitable habitat in the Project Area

A R2 sensitive plant species, *Botrychium lineare* (narrowleaf grapefern) was recently (December 2003) determined to occur in Dugout Gulch approximately 7 miles south of the town of Beulah in the Black Hills of Wyoming. No occurrences are known in South Dakota or in the Geranium Project Area. Because this species had not been documented to occur within the Black Hills until very recently, information is not currently available in the BHNH programmatic level documents for this analysis to tier to. In November 2003, an assessment for three *Botrychium* species (Beatty et al 2003) that included *Botrychium lineare* within USFS Region 2 was completed and this analysis references the

information in that document. Also refer to the *Botrychium lineare* Supplement for the Cement Project Area (USDA Forest Service 2004c).

Species Distribution

Historical and current occurrences of *Botrychium lineare* have been documented in Idaho, Oregon, Montana, California, Washington and Colorado; and in Quebec and New Brunswick, Canada. Based on new occurrence information (2003 and 2004) and continued herbarium searches of historic vouchers, the species is also now documented from Utah, Wyoming (Black Hills occurrence) Alaska, and the Yukon Territory and new additional occurrences have been found in Glacier National Park, MT (USDA Forest Service 2004c).

Habitat

Typically, moonworts are long-lived (i.e. 10-15 years), colonizing plants that may require disturbed sites to become established. This is consistent with the *Botrychium lineare* occurrence conditions from the Black Hills, which is an old native surface roadbed with ongoing low-level disturbance (USDA Forest Service 2004c). Refer to the Regional assessment (Beatty et al 2003) for a full *Botrychium lineare* description.

Typical habitat descriptions for *Botrychium lineare* are difficult to describe because known sites are so different across its currently known range (Beatty et al. 2003). This species may be a habitat generalist since habitat across the range for *Botrychium lineare* is quite variable and its' range stretches from sea level in Quebec to approximately 10,000 feet in Colorado. *Botrychium lineare* has been observed growing in primarily open habitats and often in areas with documented disturbances, both human-caused and natural (USDA Forest Service 2004c).

Baseline inventory documentation of the *Botrychium lineare* occurrence on the Black Hills shows habitat similarities as well as differences to occurrences elsewhere. The Black Hills occurrence is located on an old, native-surface roadbed dominated by graminoids and forbs. The lower slopes immediately adjacent to the roadbed are dominated by paper birch (*Betula papyrifera*) and bur oak (*Quercus macrocarpa*) with a thick shrub layer of hazelnut (*Corylus cornuta*) (USDA Forest Service 2003). Refer to the *Botrychium lineare* Supplement for the Cement Project Area (USDA Forest Service 2004c) for further information on habitat.

Risk

There is much uncertainty regarding risks to *Botrychium lineare*. Disturbances and land management activities may create and maintain suitable habitat for this species or may negatively impact existing populations, depending on the disturbance intensity and frequency (Beatty et al. 2003).

Determination

Because of the uncertainties and limited information for this species in the Black Hills and in the Rocky Mountain Region, it is difficult to assess whether the activities associated with any of the alternatives would have no effect, a potential adverse effect, or a potential beneficial effect on *Botrychium lineare*. Based on the information that is available, the project may adversely impact individuals, but is not likely to result in a

loss of viability on the Planning Area, nor cause a trend toward federal listing. The rationale for this determination is based upon the following:

1. The 2003 *Botrychium lineare* occurrence is not located within the Geranium Project boundary and would not be disturbed by the activities associated with the project. While the full extent of the distribution of *Botrychium lineare* in the Black Hills is currently unknown, the appearance of above ground sporophytes at the new site is indicative of a viable population with extensive supporting underground biomass (including mycorrhizae) (USDA 2004c). Therefore, while loss of individuals may occur in any currently unknown sites (although there may not be any) in the Geranium Project Area, the viable population at the known occurrence site would not be affected.
2. The baseline data for the 2003 occurrence documents that the species is able to colonize past disturbance areas, and the species is currently persisting at the known occurrence with limited ongoing disturbances (USDA 2003).
3. Some portions of the Project Area would be taken to a more open canopy condition that could benefit the *Botrychium lineare*. Although specific data is lacking on the Black Hills National Forest, the earlier successional conditions that occur with opening the overstory canopy could produce conditions that may be beneficial to site colonization by this wind-dispersed, spore-producing species, if the associated mycorrhizal species and other microsite conditions are present (USDA 2004c).

Refer to the *Botrychium lineare* Supplement for the Cement Project Area (USDA 2004c) for a more in depth rationale for the above determination.

3.2.4 Rangeland

This section summarizes the range specialist's report (located in the project file), which contains data, research references and detailed analysis of effects on rangeland resources. Project design features and mitigation measures discussed in Section 2.2 are intended to ensure that the project meets Revised Forest Plan direction.

The Project Area includes all or portions of the Little Spearfish, Pettigrew, and Plateau grazing allotments administered by the Northern Hills Ranger District and the Willows Springs, Stearn's Park, and Grand Canyon grazing allotments administered by the Bearlodge Ranger District. In general, the allotments have a grazing season of June through September. Most allotments have several pastures with livestock use rotated among the pastures.

Direct and Indirect Effects

Under any of the alternatives, there would be limited effects on the range resource. Short-term, the removal of timber overstory associated with the silvicultural and fuels treatments could increase secondary forage available for livestock by improving and increasing forage production. This would be most evident with alternative A, since it involves treatment of the most area. Mitigation identified in Section 2.2 is designed to minimize impacts to rangeland resources. Treatments utilizing prescribed burning would comply with Revised Forest Plan standard 4107 requiring that prescribed burn

areas be deferred from grazing for a portion or all of the following growing season to ensure regrowth of forage species.

Cumulative Effects

Meadow acreage has most likely decreased over the years as conifers have encroached on open areas. Proposed actions including aspen and hardwood enhancements, and fuels treatments would increase forage temporarily in harvested and burned stands, but would not permanently convert any areas to meadow. The incremental change to cumulative effects on rangeland resources associated with this project is miniscule.

3.2.5 Noxious Weeds

This section summarizes the range specialist's report (located in the project file), which contains data, research references and detailed analysis of effects on noxious weeds. Project design features and mitigation measures discussed in Section 2.2 are intended to ensure that the project meets Revised Forest Plan direction.

Past ground-disturbing activities, have encouraged the establishment and spread of noxious weeds. There are currently 33 acres of hounds tongue, 189 acres of musk thistle, 18 acres of common tansy, 4 acres of yellow toadflax, and 311 acres of Canada thistle located in the Project Area.

Direct and Indirect Effects

The no action alternative proposes no new ground disturbing actions, but the ongoing uses would result in continuing noxious weed problems. Scheduled treatment to prevent spread would minimize this effect.

Under the action alternatives, the increase in ground-disturbing activities such as logging, road construction/ maintenance, and increased traffic movement are anticipated to increase noxious weed infestations. The exposure of mineral soil as a result of these activities would provide a seed bed for noxious weed seed germination. This would result in displacement of native forbs and grasses with a minimal decrease in forage and browse production. Alternative B involves less vegetative treatment acres than alternative A and would result in less soil disturbance and less noxious weed infestation. Both action alternatives propose closing roads to motor vehicles, which would minimize new weed infestation in these areas. Alternative B identifies more road closures than alternative A, and consequently would be anticipated to result in less noxious weed spread. The closure of roads in Management Area 4.1 and 4.2A to motorized vehicles under both action alternatives would help minimize new infestations in these areas. Under alternative A, NFSR 134.D would be upgraded in an area currently infested by yellow toadflax, and could potentially increase the amount of infested area. This road would not be upgraded under alternative B. Under both action alternatives, the road would be closed and reseeded, which would limit the spread of noxious weeds in the area.

Under the action alternatives, scarification and seeding of disturbed areas with approved seed mixtures (required under timber sale contracts) and other mitigation identified in Section 2.2 would minimize opportunities for spread of noxious weeds.

Cumulative Effects

Historically, noxious weeds arrived in the Black Hills via contaminated hay, livestock, vehicles, and many other vectors. Ground disturbance by timber harvest, roads, fire, livestock grazing, development, and mining is often colonized by noxious weeds. Proposed actions would disturb ground through timber harvest, road work, and prescribed burning, and could add to these cumulative effects. The mitigation identified in Section 2.2 is designed to minimize the potential for noxious weed spread and would ensure the incremental cumulative effect on noxious weeds associated with this project is minor.

3.3 Physical Consequences

3.3.1 Soil and Water

This section summarizes the soil and water specialist’s report (located in the project file), which contains data, research references and detailed analysis of effects on the soil and water resource. Project design features and mitigation measures discussed in Section 2.2 are intended to ensure that the project meets Revised Forest Plan direction.

The drainage channels in Project Area flow into Little Spearfish Creek, which flows northeast and joins Spearfish Creek near Savoy. Seventh-level watersheds in the Project Area are shown in Table 21 and displayed in Figure 8.

Project Area 7th-level Watersheds		
Watershed name	Watershed number	Approximate acres
Schoolhouse Gulch	10120203040202	6,319
Upper Little Spearfish	10120203040201	5,557
Roughlock Falls	10120203040203	6,367

Table 21. Project Area watersheds

Existing watershed conditions

Natural watershed characteristics

The average annual precipitation for this area is about 18 to 19 inches. A little more than half of this total occurs during the summer. Maximum elevation in the Project Area is approximately 6,800 feet and minimum elevation is approximately 5,000 feet.

Soils found in the analysis area include Citadel 10%-30% slope, Vanocker-Citadel, and Stovho-Trebor 10%-30% slope as the major components of soil mapping units. The Citadel and Vanocker-Citadel soils have some potential for erosion and mass movement

when disturbed. Recent slumping of soils has occurred in the northern part of Section 16, T. 4 N., R. 1 E. adjacent to NSFR 134.1 (Tangenberg, 2004).

There is very little surface water in the Project Area. There is approximately 9 miles of perennial stream in the Project Area associated with Little Spearfish Creek and an unnamed tributary to Little Spearfish Creek in Section 16, T. 4 N., R. 1 E. Most other main channels are intermittent drainages. Almost all tributaries are dry, grassy or timbered draws that route water only during infrequent and intense runoff events. Most of these drainages do not indicate evidence of recent flows, do not contain a defined channel and do not exhibit channel scour exposing a gravel or sandy substrate.

Along most of the perennial section of Little Spearfish Creek, valley bottom roads NFSR 222.3 and NFSR 134.1 have altered channel morphology. NFSR 222.3 is located within 50 feet of Little Spearfish Creek between Timon Campground and Roughlock Falls, and there are many locations where water and sediment is routed to the stream during snowmelt or thunderstorms. At these locations, channel morphology is affected through floodplain alteration and restriction caused by the road. Livestock grazing and an old road adjacent to the unnamed tributary to Little Spearfish Creek have also altered channel morphology.

Floodplains within the analysis area are most affected by existing roads and their location with respect to drainages. Their location relative to roads and their condition is discussed in the project Roads Analysis Report in the project file. The Spearfish Canyon Lodge and several of the adjacent buildings are located in the 100-year floodplain of Little Spearfish Creek (HDR Engineering, 2003).

Most of the riparian ecosystems in the Project Area are associated with Little Spearfish Creek. Some drainage bottoms contain plants associated with riparian conditions, but these areas are separated by open, dry meadows and are not continuous. Existing NFSR 134.3D and livestock grazing have affected the unnamed tributary to Little Spearfish Creek.

Little Spearfish Creek has a wetland area along much of its perennial reach. There are additional wetlands associated with springs and other perennial stream channels, although the National Wetlands Inventory does not delineate them.

Constructed Watershed Features

A full inventory of existing conditions of roads in the Project Area was conducted in 2002 and 2004 (Tangenberg 2004). Specific problems were noted with 2 muddy ford crossings on NFSR 134.3D adjacent to the unnamed tributary to Little Spearfish Creek and 11 culverts on Little Spearfish Creek along NFSR 222.3 and 134.1. The muddy crossings and the culverts all contribute sediment and elevated water flows.

Most of the springs in the area have some water development associated with them, generally for livestock watering. Some springs are not fenced and are vulnerable to overuse by livestock, especially during dry years. Concentrated livestock use near allotment and pasture fences has created areas of bare, compacted earth.

Direct and Indirect Effects

Soil Erosion, Compaction, Heating, Nutrient Loss, and Mass Movement

Under the no action alternative, existing soil erosion concerns associated with roads would persist. Ruts, gullies, areas of standing water, and areas with compacted soils would continue to exist. Conditions may worsen without effective closures and decommissioning of damaged roadways. Conversely, without vegetation management activities, soil productivity and soil nutrients may improve over time. Catastrophic fire risk would continue to increase, and erosion, soil productivity, and soil nutrients could be severely impacted in the event of a major fire. Heavy precipitation and saturated soil conditions could result in continued slumping of soils adjacent to NSFR 134.1 in Section 16, T. 4 N., R. 1 E.

Under both action alternatives, fuel treatments and timber harvest activities, including felling, skidding, decking, transporting of logs off-site, and slash disposal, can affect soil resources. Potential effects to soil resources include soil compaction, displacement, and furrowing. Soil erosion can occur when rainstorms occur on sites where the ground cover has been removed. Prescribed burning associated with the action alternatives would have little effect on soils, as burned areas generally recover in a year or two. While ground disturbance would occur during road decommissioning and road construction, the decommissioned roads would no longer be sources of soil erosion once the road surfaces have revegetated. Over the long term, the road proposals would return more soil area to the productive soil base than they would remove. Sites where activities might contribute to erosion would be stabilized and maintained with erosion control measures in accordance with Revised Forest Plan standards, Revised Forest Plan standards, BMPs, and WCPs. Additional mitigation measures, identified in Section 2.2, would be employed to further reduce effects to the soil resource. Under either action alternative, with implementation of the project mitigation (see Section 2.2) and BMPs, total soil disturbance of any land unit within the Project Area would remain under 15%.

Activities proposed under alternative A for units located on the existing landslide adjacent to NSFR 134.1 could increase the risk of additional mass movement and further jeopardize the integrity of the road. Mitigation identified in Section 2.2 of this document would avoid activities in the portions of the units most susceptible to landslides. The extension of NSFR 134.3D under alternative A involves approximately 0.6 miles of new road construction in areas with unstable soils. Although the majority of the road would not affect the unstable soils, approximately 0.2 miles would be constructed on steep grades (12%) and cross a perennial stream (Tangenberg, 2004). To mitigate the effects of the road construction sediment produced by erosion would be disconnected from downstream waters through the use of BMPs and other measures (see mitigation, Section 2.2).

Streamflow Regime

Under the no action alternative, water flow volumes would depend on precipitation variability in the short term. Existing vegetation structures would persist until the next catastrophic fire event. Until that time, vegetation growth may slightly diminish water yield. Existing roads would continue to support the potential for increased water yield and delivery from roadways. Potential peak flows would remain at a higher level than

they would be without a road network, and the timing of those flows would continue to be accelerated.

Timber harvest and other vegetation management proposed under the action alternatives are not expected to increase flow volume. Regeneration and accelerated growth of remaining vegetation would balance the water equation for the area. The decommissioning and closure of roads would reduce contributions to higher runoff volumes and accelerated water delivery. The fuels treatments and prescribed burning associated with both action alternatives could result in increased runoff and water flow volumes, but would have little effect on erosion or soil productivity.

The new road construction associated with the extension of NFSR 134.3D under alternative A, would cross the unnamed tributary to Little Spearfish Creek. Mitigation would be incorporated into the road design and construction to ensure compliance with revised Forest Plan direction (see Section 2.2). Alternative B would not involve the construction of this road and would not require the mitigation.

Water Quality

Under the no action alternative, existing roads would continue to contribute sediment to the drainage network. Where surface water is present, current water temperature and dissolved oxygen conditions would generally persist.

With implementation of mitigation measures and BMPs, the action alternatives would have no negative effects on water quality. Stream crossing improvement activities under alternative A and road rehabilitation activities under both action alternatives may temporarily increase sedimentation, however in the long-term sediment flows would decrease. Streams, springs and some ephemeral draws would be buffered from activities using streamside management zones and vegetation buffers. Disturbed sites would be seeded to prevent harmful runoff and sedimentation.

Under both action alternatives, the proposed riparian restoration project near NFSR 134.1 would improve streamside vegetation conditions and subsequently improve water quality conditions influenced by sediment and water temperature. Neither action alternative is expected to have an effect on dissolved oxygen, pH, or water purity.

Channel Morphology

No new effects on channel morphology would take place under the no action alternative. The few stream channels that exist are unstable and would gradually stabilize without further disturbance. Existing road/stream crossings that affect channel morphology would continue to do so. Stream channels would continue to adjust to the increased water yield, sediment loads, elevated peak flows, and accelerated peak flow timing created by the current road system.

Increases in flow volumes and subsequent changes in stream morphology should not result from the timber harvest or fuel treatments proposed under either action alternative. Proposed activities should not alter stream channel dynamics. Project mitigation (see Section 2.2) and decommissioning of roads would reduce higher runoff volumes, and accelerated water delivery caused by the road network. These reductions would result in a more stable flow regime and reduced risk of major channel readjustment following flood events. If the proposed riparian exclosures provide

information that eventually results in improving streamside vegetation, this would improve channel stability.

Floodplains

The no action alternative would cause no new effects on floodplains. Under the action alternatives, no new roads would be built in floodplains, and effects from harvest activities would be mitigated (see Section 2.2). Roads located in floodplains would be maintained, reconstructed, or decommissioned, which would generally improve floodplain condition.

Riparian Ecosystems

The no action alternative would cause no new effects on riparian ecosystems. Existing impacts resulting from roads, grazing, and past harvest activities would persist, and conditions around Little Spearfish Creek and the unnamed tributary to Little Spearfish Creek may improve or worsen depending on management of grazing and off-road vehicle traffic. Under the action alternatives, road decommissioning/closure and the proposed riparian restoration project may have short-term negative effects, but in the long-term, riparian conditions should be enhanced.

Wetlands

There would be no effects on the few wetlands in the area under any alternative. Wetlands in the Project Area would be protected by BMPs and project mitigation (see Section 2.2). Under both action alternatives NSFR 134.3D would be closed at project completion, which in the long-term would facilitate improvement of the wetland area at this location. Wetland areas within the proposed riparian restoration exclosures would have grazing pressure reduced, and should see improvement of riparian vegetation.

Cumulative Effects

The cumulative effects area for hydrology and soils is the 7th-level watersheds depicted in Figure 8. Past, current, and reasonably foreseeable future actions in the cumulative effects analysis area are described in Section 3.1.

The no action alternative would not add to cumulative effects. Ongoing activities, including active private land development, forest recreation, timber sales, fuels reduction projects, and grazing activities would continue.

Ongoing activities identified above for the no action alternative would also continue under the action alternatives. Vegetation treatments, conducted using BMPs, would not result in unacceptable watershed effects (USDA Forest Service, 2002b). Following application of project mitigation (see Section 2.2), total soil disturbance in the Project Area would remain under 15% of any land unit. Proposed activities would be dispersed across the landscape and would take place over a period of several years, resulting in effects that would be well distributed both spatially and temporally. Though there would be short-term negative effects to soils associated with project activities, there would be long-term beneficial effects on the involved watersheds. The effects from fuels reduction activities proposed under either action alternative would be short-term and generally not persist beyond one year.

After application of project mitigation, the alternatives would have minimal additive cumulative effects on soils and/or water resources.

3.3.2 Transportation System

This section summarizes the project Roads Analysis Report available in the project file.

There are approximately 94.3 miles of system (NSFR) and unclassified roads in the Project Area. Approximately 40.8 miles of NFSRs are currently either closed year-long or seasonally. There are 11.8 miles of unclassified roads that are open to use in the Project Area. Unclassified roads are generally unplanned roads that are not part of the Forest Service maintained road system.

There are approximately 26.5 miles of snowmobile trail in the Project Area. The trails are located both on classified and unclassified roads. Established foot and horse trails in the Project Area include the Little Spearfish, Rimrock, 76 and Roughlock trails.

Direct and Indirect Effects

Alternative A would involve construction of 0.6 miles of new road, whereas alternative B would not involve new road construction. Alternative A would require reconstruction of 23.8 miles of road and alternative B would require reconstruction of 20.6 miles of road. Both action alternatives would also involve maintenance of existing roads, with alternative A requiring 17.3 miles and alternative B 15.2 miles. Both action alternatives would involve closing roads that are currently open year-long, changing seasonal road closures, and decommissioning of existing roads. Most unclassified roads would be decommissioned. Where snowmobile trails are located on unclassified roads, they would remain open for snowmobile use. Use of existing horse and foot trails would not be affected. The specific mileages associated with these proposals are reflected in Table 22.

Alternative Transportation Proposals			
Miles			
	No Action	Alt. A	Alt. B
New road construction	0	0.6	0
Road reconstruction	0	23.8	20.6
Road maintenance	0	17.3	15.2
Miles of road open year-long	53.5	40.9	37.1
Miles of road open seasonally	20.5	20.5	8.1
Miles of road closed year-long	20.3	20.3	36.5
Roads currently open that would be decommissioned	0	12.6	12.6
Miles of road per square mile	3.3	2.7	2.7

Table 22. Alternative Transportation Proposals

To comply with Revised Forest Plan direction, both Management Areas 4.1 and 4.2B would be closed to off-road travel. This is currently effective for Management Area 4.2B, but may require additional signing or closures in Management Area 4.1. Under any alternative, access to the forest for public use and administrative purposes is adequate.

Cumulative Effects

Approximately 94.3 miles of road currently exist in the Project Area. Some of these roads were constructed by the Forest Service for management access, with the remaining resulting from mineral exploration, settlement access, and more recently recreational driving. These actions have combined to provide approximately 3.3 miles of road per square mile within the Project Area. This has facilitated management of the forest, but decreased unroaded recreation experiences and affected wildlife habitat. Because of topographic constraints, there are still areas without adequate access to harvest timber. Overall both action alternatives would close roads that are open year-long, reducing the miles of road per square mile to approximately 2.7 miles. The incremental effect of either action alternative would provide site-specific benefits to non-motorized recreation and wildlife habitat effectiveness, but would have little effect on the cumulative effects of previous, current and future transportation management in the Project Area.

3.3.3 Fire Hazard and Fuel Loading

This section summarizes the fuels specialist's report (located in the project file), which contains data, research references and detailed analysis of effects on fuels. Project design features and mitigation measures discussed in Section 2.2 are intended to ensure that the project meets Revised Forest Plan direction.

Historically, the Project Area has been intensively managed for timber and other forest products. Some activities associated with these treatments, such as lop-and-scatter slash disposal, have resulted in increased fuel loadings. In addition, prolific regeneration of ponderosa pine following harvest entries has resulted in a backlog of acres in need of pre-commercial thinning. As a result, ponderosa pine is on average denser (though of smaller diameter) and more extensive with reduced understory productivity. Intensive forest management and the absence of wildfire due to fire exclusion over the past 100 years, combined with the urban and rural development occurring on the BHNF, have compounded these fuels management issues.

In general, the characteristics of vegetation and climate within the Project Area create a very volatile fire environment. Ponderosa pine produce large amounts of pine needles that are high in volatile oil compounds, dry quickly and pack lightly. Ladder fuels have not been reduced either by prescribed fires or wildfires. Many of the conifer stands have low canopy base heights due to large crowns with low branches and multiple layers of flammable vegetation. These characteristics combined with prolific pine regeneration, and an abundance of grasses and other fine fuels, provide for a high fire probability.

Direct and Indirect Effects

Under the no action alternative, the proposed fuel treatments would not be implemented. Current trends and processes, including wildfire suppression would continue. Without vegetative treatment, hazardous fuel conditions adjacent to private property would continue to increase. A large wildfire occurring in the Project Area could cause catastrophic losses given the public and private values and existing fuel conditions.

Under both action alternatives, the fuels treatments would reduce the potential of a wildfire in the project area and would reduce or retard wildfire spread and intensity (USDA Forest Service, 2004a). The managed ponderosa pine stands would be less conducive to fire spread and high fire intensities than non-managed or lightly managed stands. Open, low density stands will have a lower likelihood of crown fires than high density stands with closed canopies (USDA, 2001c).

Under alternative A, a variety of fuel reduction treatments would be implemented. These treatments include fuelbreak construction, fuel reduction activities involving mechanical and/or prescribed fire, and non-commercial thinning. The fuelbreak construction and fuel reduction activities are proposed both outside and within proposed commercial harvest treatment areas. A total of 2,812 acres of fuel treatments are proposed under this alternative. (See Section 2.1.2 for a description of the various treatments.) The largest amount of the fuels treatments is the 2,363 acres of fuels reduction that may involve either mechanical treatment or prescribed fire. The prescribed burning would be the least cost approach of the two, as mechanical treatment could be more labor intensive because of steep slopes and the small diameter tree size in the treatment areas. The use of prescribed fire would have the risk of escape with unintentional resource and economic damage. To minimize this concern, a site specific burn plan would be prepared prior to each burn to address weather, fuels, complexity, and safety.

Alternative A emphasizes fuels reduction around the private land parcels in the Project Area and is expected to provide protective measures to these properties in the event of a wildfire. Alternative A also includes 40 acres of non-commercial thinning treatment. This treatment is outside of any proposed silviculture treatment and would reduce density and height of fuel and potential fire intensity to limit the effects of a wildfire and protect biological and scenic values of Little Spearfish Canyon. In addition, the 2,848 acres of silvicultural treatment outside of the fuel treatment areas would reduce fuels in these areas and provide fuel reduction benefits.

Under alternative B, the treatment types would be similar to alternative A, but as indicated in Section 2.1.3, prescribed burning would be emphasized to benefit wildlife species. The acres of treatment type would also be different. A total of 1,709 acres of fuels treatments would occur. The majority of treatment under this alternative would be 1,117 acres of prescribed burning. Fuels reduction treatments where prescribed burning or mechanical treatment could occur would total 319 acres. On these 319 acres, the effects would be similar to those described for alternative A, only to a lesser magnitude because of the reduced acreage. All of the 1,117 acres of prescribed burning would be outside of silvicultural treatment areas, whereas all of the 319 acres would occur after silvicultural treatment. This alternative would involve 1,697 acres of silvicultural treatments outside of the fuel treatment areas that would also provide fuel reduction benefits.

Under alternative B, the emphasis of the fuels reduction program changes from protection of private property, to enhancement of wildlife habitat. The alternative treats less acres than alternative A and consequently leaves more acres at a higher risk of wildfire. In addition, the alternative would treat less acres adjacent to private property and the potential risk of private property loss as a result of a wildfire is higher under alternative B than alternative A. When compared to the other action alternative,

alternative B would have the greatest risk for prescribed fire escape, as more acres are proposed for strictly prescribed burning instead of fuels reduction (prescribed burning or mechanical) treatment.

Under alternative A, the project vegetative treatments would reduce fuels on approximately 290 acres designated as WUI (57% of the WUI in the Project Area), whereas alternative B would treat 101 acres of fuels designated as WUI (20% of the WUI in the Project Area). Under both action alternatives, a fuel break would be constructed in the ½ mile wide buffer surrounding Savoy, an At Risk Community (ARC). (See USDA Forest Service 2001b and 2001c for a thorough discussion of WUI and ARCs.) In addition, under alternative A, non-commercial thinning would be completed in Little Spearfish Canyon above Savoy. Portions of both these treatments would reduce fuels in the Savoy ARC area. Alternative A would reduce fuels on 43 acres and alternative B on 18 acres within the ½ mile buffer surrounding Savoy. Reduction of fuels in both WUI and ARC areas is anticipated to provide protection to private property in the event of a wildfire.

Cumulative Effects

Black Hills forests have been subject to modification from their essentially untouched pre-settlement state since the 1870s. Forest vegetation has been altered by humans through timber harvest, fire suppression, introduction of exotic species, human-caused wildfires, private land development, recreational use and grazing by domestic livestock. As a result, more of the landscape is forested, though the trees are generally smaller (USDA Forest Service, 1996). All or portions of the Purgatory, Lone, Crowley, Breakneck, Central, Moonshine, and Rifle timber sales have occurred in the cumulative effects area since 1990. These sales have treated approximately 4,592 acres within the area. Slash disposal techniques used in these sales included lopping and scattering, or piling and burning. Approximately 2,405 acres in the cumulative effects area is included in treatments in the ongoing Hellox, Hellgate, Plateau, Park and Rimrock timber sales. Current timber sale provisions require reduction of excess fuels in these sales. Excess fuels outside timber sales have often been left in place due to lack of funding or emphasis, but the National Fire Plan (USDA Forest Service, 2001b) provides focus on treatment of these natural fuels. Development of private land continues to increase fire hazards and values at risk

The project would reduce fire hazards where timber harvest and fuel treatments take place, to some degree counteracting the cumulative effects of fire suppression in those areas. It would also contribute to the overall Forest-wide goal to reduce hazardous fuel conditions across the Forest.

3.4 Social Consequences

3.4.1 Recreation

This section summarizes the recreation specialist’s report (located in the project file), which contains data, research references and detailed analysis of effects on the recreation resource. Project design features and mitigation measures discussed in Section 2.2 are intended to ensure that the project meets Revised Forest Plan direction.

A variety of dispersed motorized and non-motorized recreational activities occur in the Geranium Project Area. The Rod and Gun, and Timon developed campgrounds are both located within the Project Area. Other recreational improvements include several developed trails, the Capitol Christmas tree commemorative sign and the Dances with Wolves film site. Portions of snowmobile trails #1, 3, 3A, 4 and 4A are also located in the Project Area. Dispersed recreation is also popular in the Project Area, with various hunting opportunities and fishing along Little Spearfish Creek. Recreational driving is popular along NFSRs 222.3, 134.1, 733.1 and 734.1. ATV use occurs throughout the Project Area. Other available dispersed recreation opportunities include camping, biking, walking, wildlife watching, horseback riding, berry picking, cross-country skiing and Christmas tree cutting. Those portions of Management Areas 3.32, 4.1, 4.2A, and 5.6 located in the Project Area include management prescriptions providing varying levels of recreational emphasis as identified in Table 23.

Recreation Management Area Emphasis		
Management Area	Recreation Management Prescriptions	Summary of Project Effects
3.32	Semi-primitive recreation opportunities adjacent to Little Spearfish Creek	No effect. No actions proposed
4.1	Non-motorized recreation while providing other values	There are currently both system and non-system roads in the area. Both actions alternatives would close all roads in the area, except NSFR 134.3C to a gravel pit.
4.2A	Recreational opportunities in a roaded setting	Alternative A involves 40 acres of non-commercial thinning to reduce fuels to protect biological and scenic resources. The no action alternative and alternative B would not change the existing situation.
5.6	Motorized and non-motorized recreational opportunities with low open road densities	All system roads in the area are currently closed. Both action alternatives would also close all non-system roads.

Table 23. Recreation Management Area Emphasis

Currently about 94.3 miles of road in the Project Area are open to use by motorized vehicles year-round. In addition to the road system, there are approximately 26.5 miles of snowmobile trails located in the Project Area. A majority (21.1 miles) of the snowmobile trail system is located on existing roads. The snowmobile trails are maintained by the South Dakota State Snowmobile Association. Some of the snowmobile trails cross private land under agreements that allow winter use only, and conflicts have arisen when ATV riders use the trails in the summer and trespass on private land.

Direct and Indirect Effects

Under the no action alternative, recreational opportunities would remain unchanged, although based on current trends, existing ATV and OHV use could feasibly increase. Additional changes could occur as a result of an increasing emphasis on Forest-wide transportation management.

The project would affect the existing transportation network, as both action alternatives would result in fewer roads available for year-long use. Refer to Table 22 on page 68 for a listing of the specific changes. There are currently 3.3 miles of road per square mile in the Project Area, and both action alternatives would result in approximately 2.7 miles of road per square mile. These closures would affect forest users in different ways. They would have a positive effect on recreationists seeking a non-motorized experience, but would close the amount of road available to motorized recreationists. Alternative B would have the greatest effect, as that alternative would involve the most miles of road closure. Under all alternatives, sufficient access would be available for administrative purposes and fire management.

The management areas in the Project Area with a recreation emphasis (3.32, 4.1, 4.2a, 5.6) would all be managed as identified by the specific management area prescriptions (see Table 23).

Proposed timber harvest and fuel reduction activities could cause temporary disruptions to recreation. Roads used for log hauling would be busier than normal during harvest and follow-up activities. Prescribed burn areas would be temporarily closed for public safety reasons while activities are under way. Project effects on recreation users would be mitigated by the measures identified in Section 2.2.

Cumulative Effects

Construction and improvement of roads over the years has decreased opportunities for some types of non-motorized recreation, although roads also provide bike routes and easy access for non-motorized recreation. Road closure in recent years has had the opposite effect. The proposed actions would reduce cumulative effects on non-motorized recreation opportunities by closing additional roads. Closure of Management Area 4.1 to all motorized use under both action alternatives would greatly reduce the cumulative effects of roading on non-motorized recreation in this management area.

3.4.2 Scenic Integrity

This section summarizes the landscape architect specialist's report (located in the project file), which contains data, research references and detailed analysis of effects on scenic integrity. Project design features and mitigation measures discussed in Section 2.2 are intended to ensure that the project meets Revised Forest Plan direction.

The landscape in the Project Area generally appears natural to most viewers. There are some alternations to the landscape associated with past vegetation management activities, campgrounds, roads, fences, and other improvements. Human use is evident throughout the area, including: snowmobiling, ATV driving, cross-country skiing, hiking, camping and private land development. Dispersed recreation occurs year-long

throughout most of the Project Area. Suppression of wildfires over the past century has resulted in a denser forest, which helps hide other activities (roads, vegetation management, mineral exploration and removal, vehicle access and movement) (USDA Forest Service 1996 p. B-47).

High points within the Project Area are visible from US Highway 85, US Highway 14A (Spearfish Canyon), State Highway 585, and numerous other roads outside the Project Area. The main travel corridors in the Project Area include NFSRs 222.3, 134.1, 733.1 and 734.1, while smaller less traveled roads and trails provide secondary access. The drainages within the Project Area generally run from a high point in the south, flowing northeast into Little Spearfish Creek. As Little Spearfish Creek approaches Savoy near the northeast corner of the Project Area, the drainage becomes deeper and the walls steeper. During the spring and fall, hardwoods present a flush of color that dominates the Project Area drainages. Higher elevation areas contain stands of aspen and birch, that follow depressions and drainages up to ridge tops and saddles.

Direct and Indirect Effects

No direct effects would occur under the no action alternative. Existing conditions and natural processes of trees growing and regenerating would continue. Suppression of wildfires would continue to limit the natural role of fire in the landscape, and as a result the forest would continue to grow more dense, reducing visible open space and the open park-like stands.

Both action alternatives involve vegetative treatments that would affect the scenic integrity of the area. Effects under either action alternative would be similar, but Alternative B would generally be of a lesser magnitude because of the reduction in acres treated. Slash and stumps would be created, and soil disturbance associated with skid trails, landings, and staging areas would be evident during the short-term. The treatments that remove the most trees would have the largest effects on existing scenic integrity. Seed tree cuts and overstory removal treatments would remove the most trees, while thinnings would remove the least trees.

The seed tree cuts and overstory removal treatments (1,343 acres under alternative A and 1,042 acres under alternative B) would result in a more open and managed appearing landscape, but the rolling nature of the topography in the Project Area, would help make them appear less obtrusive. Many of these treatments are located in the east and southeast portion of the Project Area and this area would appear more open following treatment.

Other silviculture treatments would be less evident. The proposed thinning treatments (2,325 acres in alternative A and 824 acres in alternative B) would create opportunities for grasses and shrubs to create a more diverse vegetative matrix in the landscape. Understory grasses and shrubs, as well as the larger trees, would be more evident offering a variety of light, color and texture. Alternative A involves 20 acres of aspen/hardwood enhancement, whereas alternative B would treat 98 acres. Under these treatments, pine would be removed from aspen/hardwood stands, and the hardwoods would increase. This would increase vegetative diversity, which is an integral part of the landscape character of an area, and would also create more spring and fall color in the landscape.

The fuel treatments would result in larger trees being more visible in the landscape. In the short-term, the fire-blackened residue associated with prescribed burning would be evident until the following spring when seeds germinate. Although fire prescriptions are designed to reduce mortality of larger trees, prescribed fire would kill some trees. In the long term, prescribed burning would move the forest toward a more “park-like” appearance, a characteristic desired by the public. In the treatment areas where a mechanical fuels reduction is used, machinery would displace some ground cover and create trails similar to skid trails, but with far less negative effect. The chips and mulch created through this treatment would be evident until it decomposes; however, once that occurs, the stand will have a ‘park-like’ appearance similar to prescribed burning.

Mitigation identified in Section 2.2 would minimize slash and ground disturbance and insure the project meets Revised Forest Plan direction.

Cumulative Effects

Past activities within this planning area have included vegetation treatments, road, trail, and utility construction. Past vegetation treatments in the form of open areas are generally not evident from the main roads in the planning area. Because of the gently rolling nature of the terrain, areas of past vegetation treatment, are not easily seen when viewed from other locations.

The Project Area displays some evidence of past treatments. Under any of the alternatives, the entire landscape would not be treated, and a mosaic of tree densities, and distribution, would be evident. The overstory removal treatments should move the forest toward a young, but densely growing, forest. Where large contiguous areas of overstory removals occur, the area would have low scenic integrity. Where the landscape is dominated by commercial thins, fuel treatments and hardwood restorations, the area would have a moderate to high scenic integrity. The incremental change in cumulative effects under any alternative would be negligible.

3.4.3 Heritage Resources

This section summarizes the heritage specialist’s report (located in the project file), which contains data, research references and detailed analysis of effects on the heritage resource. Project design features and mitigation measures discussed in Section 2.2 are intended to ensure that the project meets Revised Forest Plan direction.

The Project Area contains numerous cultural resource sites that relate to the prehistoric and historic time periods representing occupation and utilization of resources in the northwest Black Hills. The majority of the cultural resource sites in the area relate to historic period transportation systems, homestead, farmstead, and cabin dwellings, and depression era water development projects. There is a general lack of water in the Project Area and both prehistoric and historic use often centered around natural springs.

Cultural resource surveys have been completed for all areas that would be affected by this project under any of the analyzed alternatives. As a result of these surveys, 13 cultural resource properties have been evaluated as eligible or potentially eligible for nomination to the National Register of Historic Places (NRHP). An additional 37

cultural resource properties have been evaluated as not eligible for nomination to the NRHP.

Direct and Indirect Effects

There would be no effects on heritage resources attributable to the no action alternative. Under the action alternatives, potential effects could occur in association with road construction, road reconstruction, road decommissioning; timber harvest with heavy equipment, and fuel reduction activities.

Under alternative A, 9 of the eligible or potentially eligible heritage sites are located within or adjacent to treatment areas. Under alternative B, there are 8 sites located within or adjacent to treatment areas. No effects are anticipated on heritage resources under either of the action alternatives provided all eligible and potentially eligible properties, Traditional Cultural Properties, and culturally significant areas are avoided or effects mitigated as described in the Heritage Report. If the proposed sanitation treatments identified under both action alternatives are identified for areas not included in the report, additional survey and consultation would be required prior to implementation. Mitigation in Section 2.2 requires review of all sanitation treatments prior to implementation by the IDT.

Mitigation measures for the project were developed in consultation with the South Dakota State Historic Preservation Office, Native American Tribal Historic Preservation Offices, and other applicable interested parties. The South Dakota Historic Preservation Office concurred on April 22, 2004 with the determination that there would be no effect on heritage resources provided the identified mitigation measures are included in the project (SHPO Project Number 040324001F). The Forest would be in compliance with Section 106 of the National Historic Preservation Act under each alternative, for all proposed activities.

Cumulative Effects:

Adverse cumulative effects to heritage resources on and around the National Forest result from the advances of time (such as weathering/erosion), destruction through development, inadequate or inappropriate maintenance, and/or vandalism. As a result, the research value of heritage resources can disappear. The proposals being considered under this action have the potential to cumulatively impact heritage resources, but by avoiding or mitigating effects on all cultural properties, no cumulative impacts are expected to occur under any alternative.

3.4.4 Economics

Figures generated by economic analysis of timber projects are usually used as a means to compare alternatives (rather than as an absolute measure) because timber prices tend to fluctuate widely. For example, average sawtimber stumpage price in the Black Hills was \$228.00 per thousand board feet in 1999. Between January of 2000 and March 2003, however, the average price was \$157.40 per thousand. There is no way to predict the probable price at which a future timber sale would sell, and actual economic efficiency of this project depends on that factor.

Economic analysis of alternatives A and B using current stumpage rates indicates that under both action alternatives costs would exceed revenue. This is partially attributable to current low timber prices, as higher stumpage prices would generate more revenue. The highest costs are associated with timber sale layout and administration; road construction, reconstruction, and maintenance; and fuels reduction treatments and prescribed burning.

The economic analysis was generated using Quick Silver, a Forest Service economic analysis program customized for the Rocky Mountain Region and the Black Hills National Forest. Present net value (the future benefit of the project discounted to the present) is -\$1,506,407 for alternative A and -\$792,820 for alternative B. Both action alternatives have similar cost benefit ratios (.47 and .48).

Various costs and benefits were not included in this analysis. Some of these, such as recreational activities, take place across the National Forest and the Black Hills region. Recreation has an economic effect on local communities, but there is insufficient information to determine the contribution of this project to this effect. Fuel reduction projects are costly in the short term, but the cost of a wildfire that may have been prevented by the fuel reduction could be exponentially higher but difficult to fully take into account in economic analysis. Other non-market factors, such as the value of habitat for rare species, are difficult to quantify and compare directly to commodities.

Cumulative Effects

The cumulative effect of implementing the Revised Forest Plan is discussed in depth in the EIS for that document and includes the counties overlapping the National Forest (USDA Forest Service 1996).

The Black Hills area economy was dominated by mining, timber harvest, and agriculture for many years. The region's economy is now well diversified (USDA Forest Service 1996 p. III-473), but the future of some timber operators in the highly competitive forest products industry continues to be uncertain.

3.4.5 Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," provides that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." It further requires that Federal agencies conduct its activities in a manner that does not discriminate against individuals or populations because of race, color, or national origin.

Within the Project Area, there are no communities with low-income or minority populations. No activities related to this project would disproportionately affect or discriminate against any individual and/or population. All federally recognized Native American Tribes with an interest or historical connection in the study area were notified during scoping for the project. No comments were received from any of the tribes during scoping. Consequently, specific actions necessary to address environmental

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justice concerns were not identified. Additional information on sociological and economic effects of management of the BHNF is available in the Revised Forest Plan FEIS (USDA Forest Service 1996 p. III-457).

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8 APPENDIX C – MONITORING PLAN

Action, effect, or resource	Method	Frequency of measure	Purpose	Responsible party
General				
Sanitation Treatments	Field Surveys	Ongoing prior to each individual treatment.	To assess effectiveness of treatments, determine if treatment effects are analyzed in the EA, and determine need for additional measures.	Interdisciplinary Team
Biology				
Marten habitat	Track plate surveys	Annually	To assess marten presence	Wildlife biologist
Goshawk use of Project Area	Field surveys during nesting and fledging seasons	Annually	To find any new or unknown nests that may need protection during proposed activities	Wildlife biologist
Goshawk nests	Field visits to active or historical nests during nesting season	Annually	To determine presence of breeding goshawks	Wildlife biologist
Big game and game fish species	Determined by State agency	Determined by State agency	To determine presence and population trends of game species across the Black Hills	South Dakota Department of Game, Fish and Parks
Aspen regeneration	Field surveys	One and five years after treatment	To determine effectiveness of regeneration and utilization by ungulates.	Wildlife biologist
Region 2 sensitive plants	Field surveys	As identified in the Forest Monitoring Plan	To determine impacts from management actions	Forest botanist
Sensitive Plant located near proposed riparian exclosure	Field surveys	Annually for duration of exclosure	To assess effectiveness of mitigation and determine need for additional measures	District botanist
Soil and Water				

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Action, effect, or resource	Method	Frequency of measure	Purpose	Responsible party
Soil erosion on disturbed sites	Field surveys	One and three years after treatment	To assess effectiveness of mitigation and determine need for additional erosion control	Hydrologist
Riparian restoration exclosures	Field surveys	Annually for duration of exclosure pending completion of AMP.	To assess effectiveness of mitigation and determine need for additional measures	Hydrologist, travel management specialist
Transportation Management				
Road proposals	Field surveys	Ongoing after treatment	To determine effectiveness of road closures and impacts of 4X4 vehicles and ATVs. Determine need for additional measures.	Hydrologist, travel management specialist
Improvement of NSFR 134.3D and/or closure	Field surveys	One year after treatment	To assess effectiveness of mitigation and determine need for additional measures.	Hydrologist, travel management specialist
Fire and Fuels				
Fuel treatments	Fuels inventory transects, fixed radius vegetation plots, digital photo points	Following treatment	To determine post-burn fuel loading and effectiveness of burn	Fuel specialist
Rehabilitation of fuels treatments	Field inspection	One and three years after treatment	To assess effectiveness of rehabilitation and determine need for further treatment	Fuels specialist, range specialist, weed specialist
Silviculture				
Hardwood dominance	Plot survey	Five years after treatment	To quantify amount of hardwoods and dominance	Wildlife biologist
Grassland cover	Walk-thru survey	Five years after treatment	To quantify amount of grassland	Wildlife biologist

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Action, effect, or resource	Method	Frequency of measure	Purpose	Responsible party
Regeneration success, grass/forb structure, wildlife diversity	Plot survey	Five years after treatment	To quantify amount of grass/forb	Wildlife biologist, silviculturist
Sustainable commercial forest	Plot survey	Three and five years after treatment	To quantify regeneration success	Silviculturist
Snags, cavity nesting sites	Walk-thru survey	Five years after treatment	To determine effectiveness of prescription	Wildlife biologist, silviculturist
Vegetative diversity, fuel profile	Plot survey	Five years after treatment	To quantify resulting fuel loading and stand condition	Fuels specialist, silviculturist